

*the*

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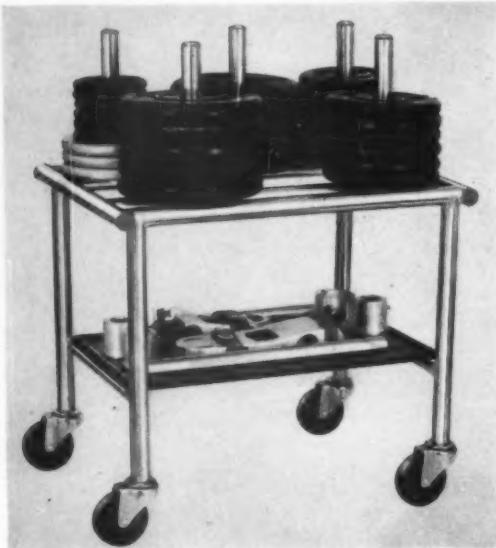
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# A COMPARISON OF THE EXERCISE TOLERANCE OF POST-RHEUMATIC AND NORMAL BOYS

FRED W. KASCH, Ed.D.\*

## Introduction

For many years the medical professions, and the pediatrician in particular, have needed an objective means of assessing the functional capacity of the young cardiac (20) (22). Clinical data as well as subjective judgment (14) appear to be inadequate. In 1946, Dr. Henry Poncher, then Head of the Department of Pediatrics at the University of Illinois College of Medicine, was searching for a means of assessing the functional capacity of the post-rheumatic child. Dr. Poncher expressed the belief that the patients were becoming cardiac invalids and were not returning to their full functional capacity. Other physicians (4) (8) (10) have made similar observations. Wolffe and Digilio (36) stated:

There was a time in medicine, not so long ago, when all heart conditions were treated by the three R's: rest, more rest, and more rest. This, we found, debilitated the patients. Since we have been permitting these patients to engage in activity they are better off physically, socially, and mentally. To us the conclusion that the human being needs exercise in order to function normally seems inescapable and we feel that this also holds true for the heart patient. Physical activity, however, should be personalized for each patient.

White (32), Harrison (9), Wilson (34), and Taylor et. al. (30) have cited the need for activity for the cardiac patient.

Today, the control of rheumatic fever is better than in previous years, yet the search for its cause goes on in the laboratories and hospitals. Until the cause is known, some children will continue to contract this disease. While the disease continues, the rehabilitation of the patient remains a problem to medicine. The question is, how much and what kind of physical activity can the child tolerate? White, Rusk, Lee and Williams (33) in a recent publication do not give an objective means of assessing the functional capacity of the rheumatic child. Neither do Bland and Jones (3), Robertson, Schmidt, and Feiring (24), St. Lawrence (26), Simon, Mack and Rosenblum (27), or Wood and Lee (37) all of whom are referred to by White et al (33). Most of these authors acknowledge the value of activity and assessment in the rehabilitation of the rheumatic patient, but what tests are available?

Master and Oppenheimer (16) (17) devised a test

for normal adults to determine their exercise tolerance. The test determined abnormality to response, but gradation was lacking. Karpovich and others (10) empirically set up standards for adult rheumatic cases. Nylin (21) measured normal and cardiac adults by respiratory metabolic methods, but did not report any findings on children. He reported a greater  $O_2$  debt in adult cardiacs as compared to normals.

Wolffe (35) as well as Simonson and Enzer (28) believe that the assessment of any cardiac's functional capacity necessitates an activity or performance test. The latter workers also found that oxygen consumption or respiratory metabolic methods were helpful in assessing work capacity.

The above review of the literature demonstrates the need for functional test of cardiac children. Due to the lack of such tests it was necessary to devise an exercise test and to measure the work capacity by oxygen consumption or respiratory metabolic methods. In this way a reasonably objective measurement could aid the physician in his assessment of the child. This assessment would be helpful during the patient's rehabilitation as well as for his schooling, sports and physical education participation, avocation or recreational play, and for vocational guidance. It would also give a periodical yard stick of functional progress until young adulthood.

The New York Heart Association stated in its 1955 publication (20) that there is no clinical test which will measure accurately the functional capacity of the heart. They state that the usual method of appraisal is only approximate and is derived largely by inference from the history. This is a somewhat inadequate method for post-rheumatic children and has been recognized as such by Poncher (22), Carmichael (5), and Edgar (7). Would an exercise test, as suggested here, with resulting data, be more objective, accurate, and reliable? This is Poncher's (22) original question.

## The Subjects

The 27 cardiacs were post-rheumatic patients in therapeutic classes C and D as defined by the New York Heart Association standards (20) and were classified by the medical director (15) of the hospital. All were white males 8-13 years. Most patients had

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a normal sedimentation rate. All were hospitalized at La Rabida Cardiac Sanitarium in Chicago under very exacting medical care and rehabilitation. Their length of hospitalization ranged from two to twelve months. No medication was given prior to the tests, and all patients were basal or post-absorptive. Their degree of residual was quite varied. Early in the project, difficulty was encountered in obtaining patients. Had patients been carefully classified according to valvular damage, the number would have been significantly limited. It was therefore necessary to use all available male patients within the selected hospital in order to prove that post-rheumatics can tolerate exercise and that functional capacity can be measured.

Some Negroes were studied, but were omitted from the final group of 27 patients. The results of the Negroes tested did not appear to vary from those of the caucasians.

In order to assess the functional capacity of the patients a standard or guide was necessary. The standards of previous workers, such as Bing (2), Morse (18), Robinson (25), and Astrand (1) were not comparable. This meant using the same test for "cardiac" and "normal" subjects. Twenty-seven "normal" boys were carefully selected. Each matched a rheumatic patient within 6% of height, weight, and age. All were free of any cardiovascular disease as judged by a practicing physician, were healthy, and had never contracted any severely debilitating disease.

The correlation for body surface area of the two groups, patients and "normals" was 0.99. This almost perfect matching for size was surprisingly good and more than could be expected.

#### *The Method*

Respiratory metabolism is commonly called  $O_2$  consumption. The technique in this study included a BMR, a 3 minute exercise test, and a 30 minute recovery phase, which was divided into 5 minute and 25 minute periods. The subject came to the laboratory in the fasting or basal state at 7:00 A.M. He rested for 30 minutes and was then given a 10 minute BMR by the "open system" or Douglas Bag (6) method. This was followed by the 3 minute exercise test and the 30 minute recovery period. The "open system" consists of a two-way valve mouthpiece, with nose clip, which permits the subject to inhale outdoor air and exhale through a corrugated rubber tube into a large collection bag. In this manner the amount of  $O_2$  consumed or the  $O_2$  intake can be

measured. The latter is calculated by analyzing samples of the collected air for  $CO_2$  and  $O_2$ , plus measuring the volume. Knowing the percentage of  $O_2$  extracted from the collected air and knowing the volume (ventilation), the amount of  $O_2$  utilized, or the  $O_2$  intake, can be calculated for a given amount of time. It is then standardized for a one minute duration and normalized for body size by dividing by the subject's body surface area. The result is the amount of  $O_2$  in ml used per minute divided by the subject's body surface area ( $M^2$ ). It is written as  $ml/min/M^2$ . Some investigators use kg. to allow for differences in body size, particularly during the exercise and recovery phases. Other measurements obtained by the "open system" method in addition to  $O_2$  intake, were ventilation rates, and "true  $O_2$ " or the percent of  $O_2$  extracted from the lung ventilation. Oxygen intake, ventilation rates, and "true  $O_2$ " were all measured during the four periods, namely, BMR, 3 minute exercise, 5 minute recovery, and 25 minute recovery.

The exercise test consisted of stepping up and down in four counts on a 12 inch bench at a stepping rate of 24/min. The duration of the exercise test was 3 minutes. It was adopted after experimenting with 12 inch, 14 inch and 16 inch benches at a stepping rate of 20, 24, and 30 per minute. "Cardiac" and "normal" subjects of both sexes, aged 6-14 years, were used in the original pilot experimentation.

The bench height as well as the rate and duration were found to be within the ability of the "cardiacs" at the selected hospital. The exercise was not too strenuous, yet it caused enough work to distinguish between the various degrees of tolerance of all ages tested.

All subjects were carefully introduced to the test prior to the actual testing day. All subjects were eager to be tested. Their cooperation was excellent. The "cardiac" subjects were equally as eager to be included in the study as the "normals." The attending physicians and hospital personnel were most cooperative and interested in the work. An excellent rapport was developed between the subjects and the examiner.

In addition to the  $O_2$  consumption measurements, pulse rates were recorded at 15 sec. intervals during the first five post-exercise minutes. A stethoscope was used by the examiner to obtain the rates. All subjects were tested on two consecutive days to minimize variances and to check for accuracy and reliability of the results.

COLUMN	1	2	3	4	5	6	7
GROUP	3' Ex. O <sub>2</sub> Intake ml/min/M <sup>2</sup> STPD	3' Ex. O <sub>2</sub> Intake ml/min/kg STPD	3' Ex. Ventil. Rates L/min/M <sup>2</sup> STPD	5' Rec. Ventil. Rates L/min/M <sup>2</sup> STPD	"True O <sub>2</sub> " 3' Ex. %	Recovery Pulse Rate 0-1 min. after Ex.	Recovery Pulse Rate 1-2 min. after Ex.
CARDIAC	728.0	24.6	17.9	7.91	4.22	119.0	100.2
NORMAL	763.8	26.2	14.8	6.67	5.23	89.6	75.0

"Normal" Boys, 8-13 yrs., STPD\*

Means of Certain Measurements Comparing Post-rheumatic and

\*STPD—Corrected for Standard Temperature and Pressure Dry where applicable

TABLE I

*Results and Discussion*

After testing approximately 50 post-rheumatic patients, mostly boys, it was found that all except those with severe chorea (or St. Vitus Dance) could perform the exercise. Those nearly recovered from chorea were able to perform the test. No ill effects were observed of any kind during or after the test. Some patients on bed rest from 9-12 months could perform the test. Extreme fatigue occurred in a few cases. Others found the stepping as easy as did the "normal" subjects. Thus a wide range of results occurred.

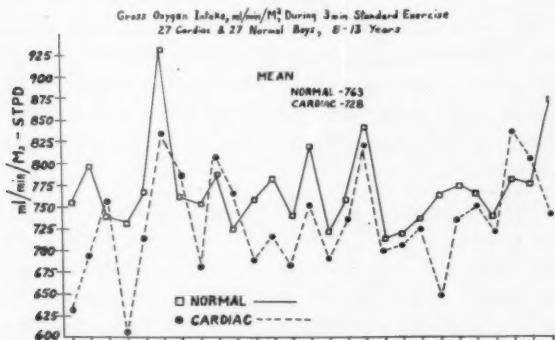


FIG. 1

The O<sub>2</sub> intake data during the three minute step test were of more value than the recovery data as found by the statistical treatment of analysis of variance. The mean O<sub>2</sub> intake during exercise was slightly less for the "cardiac" as compared to the "normal", 728.0 ml/min/M<sup>2</sup> and 763.8 ml/min/M<sup>2</sup>, respectively. Fig. I illustrates this relationship between matched subjects. Note the parallelism of the subjects.

In the 5 minute recovery period the O<sub>2</sub> intake was slightly greater for the "cardiac" than the

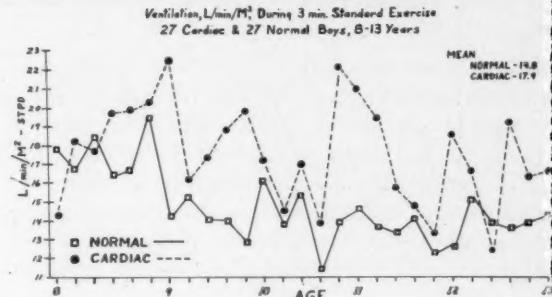


FIG. 2

"normal" subject. The mean scores are 270. ml/min/M<sup>2</sup> for the "cardiac" and 260.2 ml/min/M<sup>2</sup> for "normals." During the 25 minute recovery phase it was almost equal; 178.0 ml/min/M<sup>2</sup> for "cardiacs" and 181.6 ml/min/M<sup>2</sup> for "normals". Although there was a statistically significant difference between the O<sub>2</sub> intake of the cardiac and normal subjects during the 3 minute exercise phase, O<sub>2</sub> intake does not distinguish the greatest differences between the two types of subjects measured, as regards their exercise tolerance. As will be seen later, it is not the amount of O<sub>2</sub> intake that gives us the difference between "cardiac" and "normal" boys, but the method of obtaining the O<sub>2</sub> which is the distinguishing factor.

The mean ventilation rates showed significant differences which were greater than those of O<sub>2</sub> intake as seen by the analysis of variance techniques. Fig. II indicates the relationship during the 3 minute exercise period. Only three of the 27 cardiac subjects had lower ventilation rates than their matching normal subject during the exercise.

Very little difference appeared between the two groups in their ventilation measurements during the 25 minute recovery period. The mean volume for

NORMAL CLASSIFICATION	PULSE RATE 0-1 MINUTE AFTER EX.	SUGGESTED FUNCTIONAL EQUIVALENT CLASSIFICATION FOR CARDIACS (i.e., New York Heart Association Standards)
Excellent	71-78	Class I
Very Good	79-83	" I
Average	84-99	" I
Below Average	100-107	" I
Poor	108-118	" I
	119-129	" II
	130-140	" III
	141-UP	" IV

\*The 3 minute Step Test is performed on a one foot bench at a rate of 24 steps per minute.

\*\*Workers are cautioned in the use of this table. Read the text and use the table only as a partial assessment procedure. Using the pulse rates with complete respiratory metabolic methods is always preferred.

Preliminary Classification of Post-Rheumatic Boys, 8-13 years, Based on the Pulse Rate Data of 27 "Normal" Boys, 0-1 minute after a 3 minute Step Test and 27 Post-Rheumatic Boys\*

TABLE II

"cardiacs" is 4.93 L/min/M<sup>2</sup>, and that for "normals" is 4.45 L/min/M<sup>2</sup>. A greater difference occurred during the first phase of recovery. Table I, column 4 indicates the mean scores and Fig. III shows the comparison of subjects during the 5 minute recovery period. Ventilation measurements indicate a definite difference between "cardiac" and "normal" subjects.

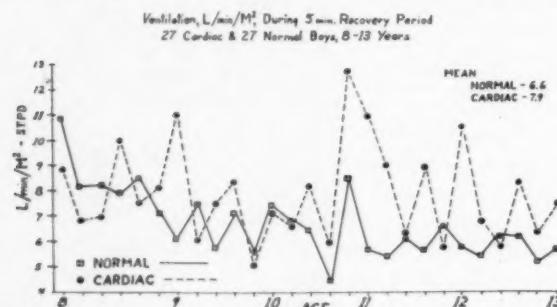


FIG. 3

Another measurement which indicates a decided difference between post-rheumatic and "normal" subjects is the "true O<sub>2</sub>" or percent of O<sub>2</sub> absorbed from the lungs. During the 3 minute exercise period there is a significant difference between "cardiac" and "normal" subjects at 0.001 level as judged by analysis of variance. Less significance developed during recovery. Table I, column 5 gives the mean figures for "cardiac" and "normal" subjects during exercise. In the 5 minute recovery period the post-rheumatic has a "true O<sub>2</sub>" of 3.54%, while the "normal" has 4.01%. During the 25 minute recovery period the figures are 3.77% and 4.20%, respectively. Kjellberg (13) explains the "true O<sub>2</sub>" as being related to the blood

pumping ability of the heart. The cardiac boy has less ability to pump blood than the "normal" as seen by the "true O<sub>2</sub>" measurements.

The difference between a post-rheumatic with great residual and the "normal" lies not in the amount of O<sub>2</sub> consumed or O<sub>2</sub> intake, but in the method of obtaining the O<sub>2</sub>(11). This is true only in sub-maximal exercise. For example, the "normal", inhales 50 l. of air and extracts 6% O<sub>2</sub>, thus consuming 3 l. of O<sub>2</sub>. In contrast, the post-rheumatic inhales 100 l. of air and extracts 3% O<sub>2</sub>, thus consuming an equal amount of O<sub>2</sub> or 3 l. His respiratory system is doing twice the work of the "normal" and yet he obtains the same amount of O<sub>2</sub>. His heart is also working much faster as evidenced from the pulse rate results.

As the amount of exercise is increased, the post-rheumatic boy will be limited in his tolerance by his O<sub>2</sub> intake(28). That is, he will be able to obtain a limited amount of O<sub>2</sub> (O<sub>2</sub> intake) and thus must stop exercising whereas, the "normal" boy can continue to increase his O<sub>2</sub> intake and thus perform a greater amount of exercise or work. The 3 minute step test on a 12 inch bench at a rate of 24 steps per minute increases the amount of work performed (or O<sub>2</sub> intake) approximately 4 to 5 times the BMR (11) (23) (29). A few cardiacs in this study were at their maximum O<sub>2</sub> intake as estimated by their ventilation, "true O<sub>2</sub>", and recovery pulse rates. Astrand (1) in a thorough study of the maximum exercise limits or maximum O<sub>2</sub> intake found that the mean maximum O<sub>2</sub> intake was 1700 ml/min/M<sup>2</sup> for "normal" boys aged 8-13 years. The mean range was from 1590 ml/min/M<sup>2</sup> to 1830 ml/min/M<sup>2</sup>.

The mean maximum  $O_2$  intake of Astrand's subjects was about ten times above the BMR. Thus one can see that the "normal" boy increases his  $O_2$  intake a considerable amount during maximum effort. Simonson and Enzer (28) have pointed out the value of maximum  $O_2$  intake as a measurement of heart function but caution against this technique with "cardiac" subjects. Thus, a sub-maximal effort such as the 3 minute step test is a more practical approach to assessing the young rheumatics' exercise tolerance or capacity for work.

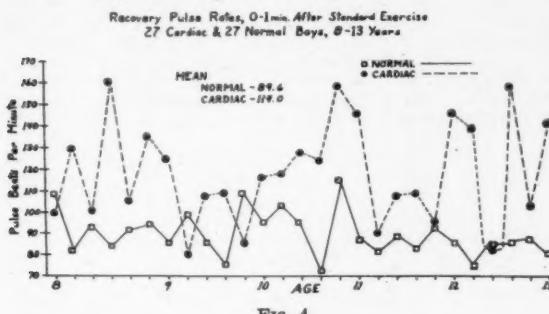


FIG. 4

The recovery pulse rates showed a decided difference between "normal" and "cardiac." There was a mean difference one minute after the exercise ceased of 30 beats per minute, 119.0 and 89.6, respectively. This similarity continued throughout the first five recovery minutes, at which time recording stopped. Table I, columns 6 and 7 give the results for the first two minutes. Fig. IV compares the subjects during the first recovery minute. The rapid "cardiac" heart is apparently less effective than the "normal" heart. It pumps faster, yet less  $O_2$  is picked up by the blood as indicated by the low "true  $O_2$ ." If the pulse rate is carefully interpreted with the other data, it becomes a valuable means of assessing cardiac function. However, a word of caution is necessary at this point. Although there is only a small amount of supporting clinical evidence, the writer feels that extremely low recovery pulse rates in some cardiac subjects may be due to partial heart block (19) (31). Katz (12) states that bradycardia disappears with exercise, yet two cardiac subjects with low pulse rates also had very high ventilation rates and low "true  $O_2$ ." This would contraindicate bradycardia.

Although an adequate assessment of the rheumatics' functional capacity is dependent upon all the data, *i.e.*,  $O_2$  intake, ventilation rates, "true  $O_2$ ," and recovery pulse rates, a preliminary assessment from pulse rates only may be found in Table 2. The data is inadequate and great caution must be used in interpreting pulse rate results. It is again pointed out that the possibility of partial heart block may alter the pulse rates and

give false results. Watching dyspnea and fatigue is important in such cases. The whole test is better.

The assessment of the exercise tolerance is made by reviewing the results of the  $O_2$  intake, ventilation rates, "true  $O_2$ ," and the recovery pulse rates. The cardiac can be evaluated in relation to the normal boy. For example, a low  $O_2$  intake, high ventilation rate, low "true  $O_2$ ," and high pulse rate are indications of poor exercise tolerance or functional capacity. The degree of capacity can be determined by the amount and relationship of the above data. Sometimes the physician's assessment of the cardiac patient differed widely from the data in this study. A few cases were outstanding in this respect. It was later seen by the physician that the functional assessment by means of the exercise data was correct, thus showing the value of this method of evaluation.

The 3 minute step test using respiratory metabolic and recovery pulse rate data is recommended for assessing the functional capacity of post-rheumatic boys for the following reasons:

1. It is standardized.
2. It is a simple test which is easily administered, and it is within the limits of the young rheumatic's capacity.
3. It is more accurate and reliable than the usual methods of assessment.
4. Tentative results and norms are available (see Table 2).
5. It is more accurate and reliable than the unstandardized jumping tests usually employed by physicians.

#### Summary and Conclusions

A need for functional assessment of the post-rheumatic child was observed. Twenty-seven post-rheumatic and twenty-seven "normal," matched boys, aged 8-13 years, were given a three minute step test. The  $O_2$  consumption was measured during BMR, three minutes standard exercise, and for thirty minutes following the exercise. Recovery pulse rates were recorded at 15 second intervals during the first five post-exercise minutes.

The twenty-seven caucasian patients were a total sampling from one cardiac convalescent hospital. The twenty-seven "normal" subjects were matched for race, sex, age, height, and weight.

It was concluded that all the cardiac patients were able to tolerate the exercise without any untoward effects. Their tolerance varied considerably from normal to very poor exercise tolerance. The most effective measurements were found during exercise, namely, pulmonary ventilation, "true  $O_2$  or the  $O_2$  extracted from the lungs, and  $O_2$  intake. The recovery

pulse rate from 0 to 1 minute after exercise was also a valuable measurement. Definite comparable data from the above items aided in making satisfactory assessment of the functional capacity of the cardiac patients. This information was found to differ widely sometimes from the physician's clinical assessment. It was therefore concluded to be of great help in the assessment of the patient by the physician.

The exercise test aided the patient in developing greater confidence or *vice versa* in his exercise tolerance. Progress can be measured by the test. Patients, parents, therapists, physical educators, and the physician are all aided by a three minute exercise test when properly administered and interpreted. It must be remembered that in the last analysis the physician must have the final responsibility of managing the patient.

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#### GASTROENTEROLOGISTS BEGIN COOPERATIVE STUDY

Gastroenterologists at 14 Veterans Administration hospitals have formed a cooperative study group for research to improve treatment for patients in their specialty. Their first project is a study of benefits of surgical treatment as compared to benefits of medical treatment for gastric ulcers. Only patients whose ulcers do not appear to be cancerous will be included. They will be admitted to the study as they enter the participating VA hospitals and will be followed for at least a year after admission to determine the outcome of their surgery or the medical management of their ulcers.

The VA hospitals in the study group are located at Nashville, Tenn.; Hines, Ill.; Washington, D. C.; Iowa City; Los Angeles and Long Beach, Calif.; Coral Gables, Fla.; Louisville, Ky.; Cleveland, Ohio; Oklahoma City; Togus, Maine; Atlanta, Ga.; Chicago (Research Hospital), and Memphis, Tenn. All except the Memphis VA hospital are participating in the ulcer study.

Dr. Morton Grossman of the Los Angeles VA center is chairman of the study group and Dr. Armand Littman of the Hines, Ill., VA hospital is chairman of the ulcer study.

# THE INFLUENCE OF CYCLO MASSAGE ON PHYSICAL ACTIVITY

(As Determined by the Burpee, Trunk Flexion and Grip Tests)

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## *Introduction*

Massage for the treatment of human disorders and in association with athletic activity has been employed worldwide and from prehistoric days to the present time. Applied with varying technics it has been used to produce different effects. Hippocrates (1) recognized this when he wrote about 430 B.C., "Vigorous frictions harden the fiber, light frictions loosen it." Because of the time and special skill required for its manual application, devices producing mechanical massage-like motions were introduced in France during the 18th century. Various models of such apparatus have been produced during the succeeding years.

As with other therapeutic measures, the logical explanations for the claimed clinical results of massage must rest on objective physiological changes. Much research to establish the scientific basis of massage was performed in the latter part of the last century and summarized by Rosenthal (2). Subsequent data was additionally reviewed by others, including Pemberton (1) and Wakim (3).

Several workers refer to the vasodilation caused by the mechanical stimulation characterizing manual massage (4) and attribute it to reflex effects and to the local release of acetylcholine and histamine-like substances (3). Similar circulatory changes produced by cycle massage as determined by temperature changes and by the rate of clearance of radio-active sodium have been noted (5).

Only a small section of the mechanical vibratory spectrum has been subjected to clinical and physiological investigation. That portion characterized by high frequency, low amplitude oscillations in one plane, called "ultrasound" has received considerable attention (6). Low frequencies of comparatively high amplitude and in different planes are now the subject of investigation because of their occurrence in important fields of human activity (7).

During the course of our research we noted that the low frequency energy we were investigating caused relaxation of voluntary striated muscle in spasm due to a variety of disease processes. Subsequently, we observed that this energy could also produce relaxation of the muscles of the back in normal individuals (8).

## *Purpose*

This investigation was designed to evaluate the influence of cyclo massage on the performance of physical activity.

## *Method*

The subjects were normal college students of both sexes in good physical condition from regular college activity classes. Most of them were between the ages of 18 and 22 years. As indicated in Table I, they were divided into two groups, the treated and the control. Nearly all of the subjects in the treated group served as controls but on different days.

The subjects wore their usual clothes, no coats or sweaters. Cyclo massage was applied in four different ways. In three of these, the subjects lay supine on a single or double pad or vibrating table. In the fourth type of application, the subject lay prone on a treatment table, and the operator moved a hand device slowly over the paravertebral areas of the back and posterior aspects of the lower extremities. Treatments were applied for one-half hour.

The subjects were exposed to the same type of energy applied by apparati of different size and shape; a single pad (16x20 inches) activated by one motor; a double pad (20x28 inches) with two motors; a padded table (26x70 inches) divided into three sections each with its own motor, and a hand vibrator.

The vibratory frequencies of these apparati can be varied so as to produce the sensation which the treated individual found most agreeable. Generally a frequency of about 3000 revolutions per minute was applied. The amplitudes of the elliptical motions produced vary in different planes. Thus, with a constant load of 60 pounds, that of the longitudinal

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component is of the order of 0.4 mm; that of the vertical component about 0.2 mm; and of the lateral one, about 0.1 mm (9).

#### Description of the Tests

Four tests were used in this study, two which indicated a measure of flexibility, one of athletic performance, and one of muscular strength. Description of these tests are as follows:



FIG. 1

**Test #1. The Burpee or Squat-Thrust Test.** (Figs. 1, 2, 3)  
The starting position was standing at "attention." The subject was then asked to perform ten executions of the following four part movement as quickly as possible: (a) Bend knees and hips and place hands on the floor (squat-rest position). Fingers should point forward; arms may be between, outside of, or in front of the bent knees; (b) Extend legs backward until the body is straight from shoulders to heels (front-leaning rest); (c) Return to squat-rest position; (d) Return to standing straight as in the starting position (10, 11).

The above movements were demonstrated for the subject and he was then asked to perform 10 of the Burpees as quickly as possible. He was permitted to execute the movements in his own manner but was required to perform the same technique in the before and after tests. He was timed on a Hale Reaction Performance Machine, which records to the hundredth of a second.

#### Test #2. Standing Flexibility Test. (Fig. 4)

The subject, standing with knees straight and feet together, bent forward reaching as far as he could toward the floor in front of and close to the big toe. Both hands were kept on an equal level. The fingers were extended with the exception of the thumb of the dominant hand, which pressed the housing of a self-retracting metal tape measure against the palm. The tape itself was extended a few inches



FIG. 2

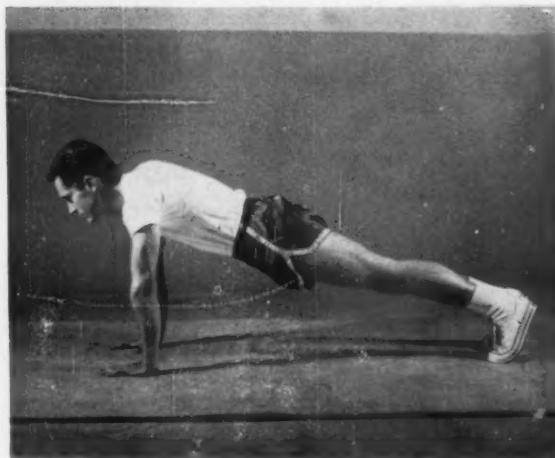


FIG. 3

prior to the attempt of the subject to force it back as he pushed it against the floor. If the longest (middle) finger reached the floor, the tape became completely retracted. If the finger did not touch the floor, the tape markings opposite the tip of the middle finger indicated the distance from the floor. If the subject could reach beyond the floor level, he stood on a stool, and the distance indicated on the tape was subtracted from the height of the stool. In the latter case the investigator held the subject's knees to insure that they were kept in complete extension and to assist in the maintenance of balance. This is similar to Test #6 of the Kraus-Weber Tests for Muscular Fitness (12). The reliability coefficient of the finger to the floor test is remarkably high (13).

#### Test #3. Sitting Trunk Flexibility Test. (Fig. 5)

This test was performed in a long sitting position with the arms in "neck firm" position. The feet were placed 18 inches apart, measurement being made at the inner malleolus. The subject was instructed to bend the forehead downward and forward as far as possible, keeping the knees straight. Measurement was made from the forehead at the base of the nose to the table by use of a metal tape (14).

At the completion of the battery of three tests, the subjects were treated with cyclo massage apparatus for 30 minutes, after which the three tests were repeated.

The subjects of the control group were given the battery

of three tests, then placed in a back lying position on a mat for 30 minutes, after which they were again given the tests.

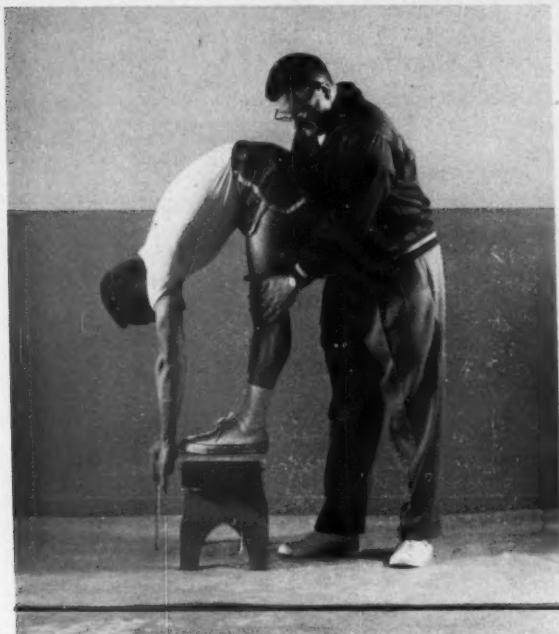


FIG. 4



FIG. 5

#### *Test # 4. Grip Strength.*

The hand dynamometer test was used to measure strength. The instrument was held in the dominant hand with the dial facing the palm. The forearm was in supination as it rested on a table or arm chair. The subject was told to squeeze the dynamometer as hard as possible. After the first reading, the subject rested the arm in pronation for 15 minutes. A second reading was taken, after which the forearm was placed in the same position on the cyclo massage pad for 15 minutes. A third reading was then taken.

#### *Analysis of Results*

A series of statistical procedures were applied to the data to determine which aspects of the perform-

ances were significantly changed upon application of cyclo massage. The performances of the experimental and the control groups are summarized in Table I. It is clear that there is a definite trend toward increased or improved score in each group where cyclo massage was applied.

Burpee	Experimental Group	Control Group
Mean (sec)	1.79	1.44
N	112	95
Variance	4.15618	4.94564
S.D.	2.04	2.22
Standing		
Mean (inches)	1.327	—.252
N	104	96
Variance	1.58322	1.34892
S.D.	1.26	1.16
Sitting		
Mean (inches)	0.484	—.112
N	108	93
Variance	1.54413	1.43698
S.D.	1.24	1.20

N—Number of subjects. S.D.—Standard Deviation

**Descriptive Data of Experimental and Control Groups**

TABLE I

In order to determine whether the change in score of this random sample could be attributed to the massage element or merely to coincidence of change, the difference between the mean scores of each of the performances was tested for significance.

	t	t <sub>.05</sub>	Conclusion
Burpee	1.18	1.97	not significant
Standing	9.20	1.97	significant
Sitting	3.46	1.97	significant

**Results of T-Tests Comparing Experimental and Control Groups**

TABLE II

The t's computed with the data and the corresponding t's of the .05 level of confidence ( $N_e - N_c - 2$  degrees of freedom) were compared. Table II shows that the difference found between the experimental group and the control group was not great enough on the Burpee test to eliminate the factor of chance occurrence. However, in the standing and sitting flexibility tests, there occurred a significant difference between the two groups. From this we can conclude that Cyclo massage has a positive effect on flexibility as measured by these tests.

	Hand	Type of Massage Double Pad	Apparatus Table	Two Pads
<b>Burpee</b>				
Mean	2.03	1.67	1.31	2.23
N	38	39	21	11
Variance	2.66	6.65	2.29	3.05
S.D.	1.63	2.58	1.51	1.75
<b>Standing</b>				
Mean	1.446	1.162	1.107	2.028
N	35	27	21	9
Variance	1.05	2.00	1.12	3.12
S.D.	1.02	1.41	1.06	1.75
<b>Sitting</b>				
Mean	.483	.526	.105	.511
N	36	39	19	11
Variance	1.95	1.30	.462	2.27
S.D.	1.40	1.14	.68	1.50
<b>Descriptive Data on Experimental Sub-Groups Treated by Different Massage Methods</b>				
TABLE III				

Burpee Source of Variation	Sum of Squares	Difference	Means Square	Variance	Level of Significance
Between means	9.6198	3	3.2006	.79	2.70
Within groups	427.3852	105	4.0703		
Total	437.0050	108			
<b>Standing</b> Source of Variation					
Between means	6.9389	3	2.3130	1.46	2.70
Within groups	155.1630	98	1.5833		
Total	162.1019	101			
<b>Sitting</b> Source of Variation					
Between means	2.5317	3	.8439	.57	2.70
Within groups	148.7204	101	1.4725		
Total	151.2521	104			
<b>Analysis of Variance Tests on Means of Gains Scores for Different Massage Methods</b>					
TABLE IV					

An examination of Table III shows some differences among the means for the various methods of massage. Analysis of variance was applied to determine if these differences were statistically significant. This is indicated in Table IV.

The variance did not exceed F.05, which implies that the differences found in performance of the tests cannot be attributed to different techniques used. In other words, cyclo massage has little or no effect upon motor performance as measured by the Burpee test. On the other hand, cyclo massage, applied in a variety of ways, has a favorable influence on truck flexibility as measured by standing and sitting tests.

The data secured from the hand dynamometer readings was also analyzed. A group of 63 subjects were tested for grip strength each with a sequence of three readings. Each subject was seated in an arm

chair and was tested for grip strength of the dominant hand. The hand was rested in a pronated position for 15 minutes and then re-tested. Following this second reading, a 15 minute period of cyclo massage was applied to the hand and forearm in the pronated position. A third reading was then taken. Results are shown in Table V.

The high correlations between the pairs of scores do not necessarily preclude significant differences between the means. A t-test for correlated means was then calculated. A t-value at the .05 level must be greater than 2.00 to indicate a significant difference. A t-value of .29, -.09, and -.44 were found to exist.

None of these scores give an indication that massage of the nature applied to the forearm decreased or increased grip strength. This high correlation be-

Descriptive Data					
	Mean Dynamometer Reading	Standard Deviation	N	Correlation	r
Score 1	96.90	38.12	63	Score 1-Score 2	.95
Score 2	96.44	34.98	63	Score 1-Score 3	.93
Score 3	97.06	36.58	63	Score 2-Score 3	.95

TABLE V

tween the scores suggest, that the hand dynamometer test was fairly consistent with each subject.

#### Subjective Reaction to the Tests

The comments made by the subjects as to their sensations after they had received cyclo massage indicated that they had experienced a feeling of relaxation. This was expressed in such statements as "I feel loose", "I feel like walking on a cloud", "I am so relaxed I can hardly move", "I could float away", "I want to go to sleep". Because of this sensation of relaxation the subjects thought that their Burpee test scores after their massage was slower, when in actuality, their performance was faster. There was a diminution of the sensation of effort expended in the work they performed. This also was the reaction on the performance of the grip test. In a few instances there was a complaint of itching which disappeared after the massage was discontinued.

#### Discussion

There have been varied reports as to the influence of various preliminary measures on athletic performance. Schmid (15) concluded that setting up exercises, hot baths, diathermy, alternating hot and cold water showers and also massage improved the performance of swimming 50 meters, running 100 meters and riding a bicycle ergometer. Asmusen and Boje (16) noted that preliminary heat treatments, such as diathermy and hot shower baths, were beneficial as evaluated in both sprint and endurance rides on the bicycle ergometer, such was not the case with massage.

The experiments carried out by Karpovich and Hale (17) showed that deep massage, digital stroking and preliminary exercise did not improve the time of running a distance of 400 yards. Although the observations herein indicate an increase in flexibility following cyclo massage, there is no increase in performance of the Burpee or the Grip Strength. This is in accord with the observations of Asmusen and Karpovich following manual massage.

Our findings indicate that relaxation of the muscles of the low back produced by cyclo massage does

not cause any significant change in the speed with which the Burpee exercise is performed. This test requires contractions of both the extensor and flexor muscle groups, and therefore cannot be utilized to determine the status of either group alone. Such a possibility is more nearly approached by the hand strength test, where the evaluated procedure is primarily applied to the tested muscle group, the hand and finger flexors. However, even here, the evaluation may not be an absolutely exact one because the mechanical massage was not strictly localized to the flexor muscle group although applied to this area. Of significance is the fact that muscle relaxation as judged objectively in the Burpee tested group, and subjectively in this and the hand flexor group, is not accompanied by any demonstrated reduction in athletic performance.

The physiological observations of Gillhorn and his associates (18) may offer an explanation for the muscle relaxing influence of cyclo massage. They found that in very lightly anaesthetized cats, proprioceptive impulses exerted a strong influence on the sympathetic division of the hypothalamus. Their findings suggest that a relaxation of skeletal musculature is accompanied by a diminution in the state of excitability of the sympathetic division of the hypothalamus and through a reduction in the hypothalamic-cortical discharges, by a similar reduction in the state of excitability of the cerebral cortex (19).

#### Conclusion

Objectively, cyclo massage increased trunk flexibility as determined by the standing and sitting tests. This increase can be attributed to relaxation of the musculature of the back. It does not increase nor decrease the ability to perform physical activity as measured by the Burpee and Grip Tests, but there was a subjective sense of greater general relaxation during the performance of the tests. The various types of apparatus employed for the application of cyclo massage yield essentially the same results.

*The equipment used in this study was supplied by The Niagara Manufacturing and Distributing Company, Pennsylvania.*

*We desire to express our thanks to Marilyn Sorum for the statistical analysis.*

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Cont'd on P. 54

# PROGRESSIVE RESISTANCE EXERCISE: ISOTONIC AND ISOMETRIC: A REVIEW\*

PHILIP J. RASCH, Ph.D.

For centuries the accepted method of developing increased strength and hypertrophy of striated muscle has been the use of progressive resistance exercises of an isotonic nature over a full range of joint movement. True, in 1946 Hellebrandt (1) had challenged the assumptions underlying this technique, suggesting that in theory more strength might be gained by the use of isometric contractions, since a

muscle develops maximum tension when the load is so heavy that it is not allowed to shorten at all. Under these conditions the muscle maintains its optimum length for maximum energy production throughout the period of exertion.

but her suggestion appears to have attracted no particular attention. Even at that time it was not particularly novel. In 1929 and 1930 students at Springfield College had conducted a series of studies which showed quite clearly that it was possible to increase strength by the use of exercises which employed short static contractions (2,3,4,5). However, later laboratory investigations by Duvall, Houtz, and Hellebrandt (6), Darcus (7), Salter and Darcus (8), and others generally failed to demonstrate any significant improvement from the practice of isometric exercises.

In 1953, the question was dramatically reopened by Hettinger and Mueller (9), who reported that a single two-thirds maximum isometric effort for 6 seconds once a day resulted in a weekly gain of 5 per cent of the initial strength, although increases in frequency, duration, or amount of effort did not result in faster or greater improvement. Steinhaus lauded this as a "history making experiment" (10). McCloy hailed it as having "tremendous significance for the entire field of physical conditioning," (11) but later his enthusiasm became somewhat tempered. While continuing to advocate its use by patients who

had suffered heart attacks or cerebral thromboses, he warned that it would not improve circulatory-respiratory endurance. In his considered opinion, weight training remains the best program for the normal person who desires to increase both his strength and his endurance (12).

Following the Hettinger-Mueller announcement, a large number of studies were instituted to investigate the validity of their findings. While the results were to some extent in disagreement, the bulk of the evidence indicated that substantial strength gains could be obtained by the practice of isometric exercises of short duration.

Lorback (13), whose results are difficult to interpret because of his use of non-comparable exercises, found that static contractions for six seconds gave approximately the same increase in muscle strength and girth as did the use of progressive resistance exercise, and cited similar findings by Taylor (14).

Baer *et al.* (15) divided 63 subjects into six groups:

- I. High Resistance Isotonic Exercise, 10 contractions per minute, for 4 weeks.
- II. High Resistance Isotonic Exercise, 30 contractions per minute, for 4 weeks.
- III. High Resistance Isotonic Exercise, 10 contractions per minute, for 4 weeks, load heavier than in I.
- IV. Low Resistance Complex Motion of Upper Extremity, 10 contractions per minute, for 6 weeks.
- V. High Resistance Isometric Exercise, 10 contractions per minute, for 6 weeks.
- VI. High Resistance Isotonic Exercise, 10 contractions per minute, for 6 weeks, lesser load than in I.

Each group exercised the right upper extremity one period a day, five times a week. There was no significant difference between the improvement produced by the different exercise regimes, although the greatest total effect resulted from high resistance isotonic exercises. They suggested that since the tension produced by a muscle decreases as the speed of shortening increases, the greatest tension should be produced at the zero-velocity shortening found in isometric exercise.

Salter (16) divided her subjects into groups of four. Each group was trained in supination of the left hand by one of the following systems:

- I. Isometrically at the rate of 15 per minute.
- II. Isometrically at the rate of 2 per minute.
- III. Isotonically at the rate of 15 per minute.
- IV. Isotonically at the rate of 2 per minute.

\*Report 60-31, Biokinetics Research Center, College of Osteopathic Physicians and Surgeons, Los Angeles, California. This research was supported by a grant-in-aid (T-1616) from the American Osteopathic Association. Three previous reviews have appeared in this series: Philip J. Rasch and Richard V. Freeman, The Physiology of Progressive Resistance Exercise, *Journal of the Association for Physical and Mental Rehabilitation*, 8:35-41, March-April, 1954; Philip J. Rasch, The Problem of Muscle Hypertrophy, *Journal of the American Osteopathic Association*, 54:525-528, May, 1955; *Ibid.*, Studies in Progressive Resistance Exercise, *Journal of the Association for Physical and Mental Rehabilitation*, 12:125-132, July-August, 1958.

She found no significant difference between the four methods of training in their effect on muscle strength.

After an experiment involving 30 maximal exertions at one minute intervals, Darcus and Salter (17) reported that

1. Static training caused a significant improvement in the maximum isometric force.
2. Dynamic training caused a significant improvement in the maximum isotonic work.
3. Static training had a variable effect on muscle strength measured isotonically.
4. Dynamic training produced an improvement in maximum isometric force.

In passing it might be mentioned that a number of years ago weight trainers experimented with something of the same sort by employing systems of training in which they performed a single maximum effort, put the weight down, and rested before performing another single movement. They found that this program increased strength but did not develop shapely muscles, fitness, nor endurance (18). The method was therefore largely abandoned by the body builders.

Wallace (19) divided 33 college women into three groups: isotonic exercise, isometric exercise, and controls. Retesting after four weeks of training showed no significant differences in elbow flexion strength. However, the isotonic exercise group showed increased endurance significant at the 1% level, the isometric group showed increased endurance significant at the 5% level, and the controls showed no change.

Peterson (20) employed five groups of subjects:

- Group I trained the right elbow flexors and right knee extensors on 36 occasions with 1 maximum isometric contraction per session. No increase in isometric strength resulted.
- Group II trained the same muscles with 10 maximum isometric contractions per day on 36 occasions. The males increased isometric strength significantly, but the females did not.
- Group III trained the right elbow flexors with 10 eccentric contractions per day on 36 occasions. No increase in strength resulted.
- Group IV trained for 15 minutes on an ergocycle on 20 occasions. A significant increase in strength resulted.
- Group V was composed of the controls and showed no change.

He concluded that his results failed to confirm Hettinger and Mueller's work and that their results were attributable to an improvement in skill rather than in strength.

This same point had been made earlier by Rasch and Morehouse (21) who reported that male subjects who performed isotonic exercises showed greater gains in strength and hypertrophy than did subjects who exercised isometrically, and went on to demonstrate that in either case very little of these observed gains in strength were transferred over into un-

familiar situations. From this they hypothesized that in most cases what appear to be gains in strength are largely gains in skill. These findings confirmed an opinion which had been expressed almost simultaneously by Rose, Radzynski, and Beatty after a study of very brief isotonic exercises. They stated that it is

almost inconceivable that this brief period represents muscular exercise in the sense in which it is traditionally regarded. . . changes in the central nervous system related to motor learning are profound indeed. The persistence of strength as a learned act certainly does not appear to be an impossible concept (22).

Hettinger-Mueller had postulated that a training effect resulted whenever the oxygen demands of a muscle were not satisfied during exercise, and that static exercise was so effective because it created particularly unfavorable vascularization conditions. Experiments designed by Morehouse, Rasch, and O'Connell (23), in which some of their subjects submitted to pressure occlusions of the upper arm, led them to conclude that this explanation was untenable. In their opinion, the key lies in the development of tension, an argument which was, in fact, advanced by Buchthal and Kaiser (24) some years earlier. However, Royce (25) has presented a study which appears to lend support to the Hettinger-Mueller interpretation.

Hettinger and Mueller (26,27,28) have continued to insist that exceeding the two-thirds maximal strength contraction or repeating the training many times a day does not improve the results, and their findings have been supported by Littlefield (29) and others. However, a considerable body of contradictory evidence is accumulating (30,31). Asa (32) found that isometric contractions repeated 20 times gave better results than did single contractions. Rarick and Larsen have raised the problem of the role of maturation in such studies, by demonstrating that pre-pubescent achieve much greater gains by training at higher levels than those advocated by Hettinger and Mueller (32), whereas post-pubescent do not (33, 34).

Liberson and Asa (35) devised an experiment to study some of the points raised by Rose, Radzynski, and Beatty, and decided that some of the conclusions drawn from the work of Hettinger and Mueller were premature. They pointed out that the strength of a muscle is at a maximum when the muscle is induced to contract at its normal resting length. During isotonic contractions the muscle approaches its normal resting length only intermittently and for very brief periods of time, whereas during an isometric contraction it may be contracted at its optimal length during the entire exercise period. While a continued isometric strain may result in obstruction of the blood

flow, intermittent isometric strains perhaps serve as blood pumps. This could explain why they found repeated isometric exercises more effective than a single bout of exercise, in spite of Hettinger and Mueller's assertions to the contrary. A number of studies have shown that the tension which a muscle may produce decreases as the speed of shortening increases. If a controlling factor in improvement in muscle tension is the tension developed by the muscle during the training period, the tension development would be greatest during the "zero-velocity" contraction of isometric exercise. In a later paper (36) they pointed out that various researchers (25,37) have demonstrated that a muscle can generate maximum tension when its length is near the resting length, and it is not allowed to shorten. On this basis they hypothesized that during isotonic exercise part of the work is done while the muscle is at an unfavorable length, and during this period perhaps the exercise does not contribute to training effects.

However, Rasch (38) has shown that isometric measurements are valid in expressing isotonic strength, and Rasch and Pierson (39) have suggested that the fact that a muscle develops the same tension during breaking point strength tests that it does during isotonic tests may offer an explanation for Logan's (40) finding that gains in strength resulting from eccentric contraction are practically identical with those resulting from concentric exercises.

The physiological differences between isotonic and isometric exercises are not well understood, and it is now necessary to turn our attention to this problem.

The contractile component of a muscle is in series with an elastic component. When a muscle is tetanized isotonically, the contractive units change from the long (L) to the short (S) state. As successive stimuli continually reactivate the contractive units, a fully activated state is maintained. Once the tension develops to the point sufficient to overcome the load, there is no further lengthening of the series elastic components. When a muscle contracts isometrically, the contractile units begin to change from the L state to the S state, but since the net length must remain constant, an increasing stretch of the series elastic components develops (41). At full isometric tension the series elastic component may be stretched by 4% or more of the length of the whole muscle (42). Fundamentally, then, there is no such thing as a purely isometric contraction. True isometry may hold for the length of the muscle, as a whole, but actually "any isometric contraction is an instantaneously varying isotonic contraction of the activated contractile components pulling against an increasing

load offered by the developing tension of the stretched series elastic material" (43).

Recent microscopic studies (44) have revealed that during isotonic contraction the A bands remain constant in length, while the I bands shorten; during isometric contraction neither the A bands nor the I bands change in length. This is interpreted as meaning that shortening is brought about by a sliding movement of the action filaments into the arrays of myosin filaments.

The heat liberated during an isometric contraction is made up of four parts:

1. Heat of activation.
2. Heat of shortening.
3. Heat of work done by the stronger units in extending the weaker ones.
4. Heat of relaxation (45).

In isotonic contraction additional energy is liberated in the form of mechanical work (46) hence less heat is liberated in isometric contractions than in contractions (Fenn effect), and the amount of energy liberated is greater than the time average of the isometric heat for all lengths through which the muscle passes in shortening. Since an isotonic contraction turns part of the potential energy of the excited muscle into external work, the heat of relaxation is less than in the isometric contraction (47).

In order to provide a qualitative means of correlating mechanical conditions with heat production, Fenn (48) devised the following comparison of the two types of muscular contraction:

<i>Isotonic</i>
Tension during shortening
Accelerates or raises load
Positive work
Increased loss of tension
Positive excess energy
<i>Isometric</i>
Isometric length
Fixation
No work
Spontaneous loss of tension
No excess energy

From the standpoint of thermodynamics, isotonic shortening and isometric tension show great similarities of behavior. In isotonic contractions shortening is a function of temperature; at a given temperature a given muscle always contracts to the same length. The degree of shortening increases with increased temperature up to a certain length, and then declines with further elevation of temperature. Under isometric conditions the amount of tension developed was found to behave in the same way; it is possible to vary the tension simply by varying the temperature. This leads to the conclusion that both isotonic shortening and isometric developing of tension are due to reversible equilibrium reactions (49).

In an isotonic contraction the increase in heat above isometric heat is roughly parallel to the work done. Some simple relationship must exist between the heat and shortening, but they are not directly proportional. A single isotonic twitch against a heavy load is accompanied by a higher energy consumption than is an isometric twitch, but isotonic twitches with small loads and large shortening require less oxygen than does an isometric twitch (50).

Some of the electrical relationships between tension and contraction have been investigated by Bigland and Lippold (51). The faster a muscle shortens, the more electrical activity is associated with a given tension. It follows that the degree of excitation of a muscle required to produce a given force of contraction is less when the muscle contracts at a negative velocity than when it contracts at a positive velocity.

Isometric contractions are accompanied by an increase in electrical impedance (resistance). This parallels the change in tension fairly closely, but lasts longer. Under isotonic conditions contraction is accompanied by a lowering of impedance which is proportional to the shortening of the fibers (52). It has been suggested that these changes are due in part to the breakdown of phosphocreatine (53), but it has not been possible to correlate changes of impedance with known physical or chemical changes responsible for the contractile process (54). Hill suggests that they are attributable to changes in the membrane (55).

The birefringence of muscle decreases slightly in isometric contraction, but considerably in isotonic contractions. This change is determined almost entirely by changes in the length of the muscle. It indicates that active contraction and passive stretching are opposite processes (56).

Soviet students (57) report that during static exercise the quantity of lactic acid in the blood and urine is less than is the case during dynamic work. Unfortunately the significance of this difference is difficult to assess without some quantification of the energy expenditure involved. The Russians believe that fatigue during isometric efforts develops primarily from functional changes in the central nervous system caused by the need for an uninterrupted stream of nervous impulses, whereas during isotonic work there is an alternation between the processes of neural excitation and relaxation, requiring only intermittent activity of the central nervous system.

To a lesser degree they attribute fatigue during static effort to the disruption of the circulation in the contracting muscles. Presumably this would not

be the view of the majority of Western scientists, since it has been shown that while strong muscular contraction does compress the blood vessels for a short period, the influence of dilator substances released from the muscle fibers soon causes them to dilate to a certain extent (58,59). This is probably the explanation of the statement that circulation through a muscle is of no functional importance in strong static work (60). A number of investigators have suggested that the fatigue which results from static effort is largely due to the pull and pressure on the nerve endings in the muscles and skin. The limits of endurance in static efforts appear to be established by the amount of discomfort which the subject is willing to endure (61,62).

Clark (63) observed that oxygen income was significantly less during isometric exercise as compared with dynamic work of a similar metabolic level and that the oxygen debt was significantly greater. He attributed this to the fact that the circulation was cut off by muscular tension during isometric efforts. Bedford, Vernon and Warner (61) had previously recorded similar phenomena but attributed their cause to the painful sensations of strain associated with this type of exercise.

Under clinical conditions, "muscle-setting" exercises have long been utilized by therapists, but Boyle (64) and others have expressed some doubts as to their value. Chepesuik (65) comments that one of the values of weightlifting exercises is that a person either lifts the weight or he does not, and this leaves no place for half-hearted performance. It is precisely the lack of any simple means of insuring maximum exertion by the patient which Baer *et al.* (15) consider a deterrent to using isometric exercise under clinical conditions. They also suggest the possibility that too great tension development in such exercises might involve the danger of exceeding the elastic limits of the passively stretched elements in the muscle. Gucker (66) contends that the contractions of muscle whose tendons have been lengthened or directly sutured should be limited to isometric exercise during at least the first ten days postoperatively. Nichols and Parish (67) consider that it may be useful in facilitating functional recovery during the later stages of rehabilitation after fractures of the tibia, and Rose, Radzminski, and Beatty (22) have gained the impression that patients exercised by brief maximal contractions do as well clinically as those exercised by conventional PRE techniques. Buchthal and Kaiser (24) suggest that the two forms of exercise may have different physiological effects, isometric exercise tending to increase the

connective tissue at the expense of the muscle substance and isotonic exercise tending to increase the muscle substance at the expense of the connective tissue.

#### Summary

Strength may be increased by the use of either isotonic or isometric exercise. The cause of the development of increases in strength is in dispute, but appears to lie in the development of tension, and strength gains appear to be greater when tension is developed frequently during the course of the training program. The reason isometric training has been found effective may be that the tension is greatest during "zero-velocity" contractions. From the standpoint of thermodynamics, isotonic and isometric exercises are very similar, although a greater amount of heat is liberated during an isotonic contraction, this quantity being roughly parallel to the work done, but there are other physiological differences. Fatigue during isometric exercise is probably due to the stress on the nervous system. Clinical experience indicates that isometric exercises are useful in the therapeutic situation. Much further study of strength and its development is needed before definite answers can be given to many of the problems connected with it.

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# PHYSICAL MEDICINE AND REHABILITATION FOR THE SMALL HOSPITAL\*

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Before 1954 the Federal Hospital Survey and Construction Act provided funds for the construction of general, tuberculosis, mental and chronic disease hospitals and Public Health centers. In 1954, the Act was amended to include four new categories of medical facilities, one of which was for the construction of rehabilitation centers. The United States Public Health Service regulations governing the allocations of monies defined the rehabilitation center as:

a facility providing community service operated for the primary purpose of assisting in the rehabilitation of disabled persons through an integrated program of medical, psychological, social, and vocational evaluation and service under combined professional supervision—the major portion of such evaluation and service to be furnished within the facility, and the facility to be operated either in connection with a hospital or as a facility in which all medical and related health services could be prescribed by persons licensed to practice medicine or surgery within the individual states or territories.

In presenting this new program to the public great emphasis was given to the fact that the integrated program brought together as a team specialized personnel from the medical, psychological, social, and vocational areas for the purpose of pooling information and professional interpretations for the development of a rehabilitation plan of service in which the disabled person could be viewed as a whole. In order to qualify as a recipient of the Federal funds (on a matching basis) the various specialists' services were required to be available to the patients in the facility—the degree of care from any one of the specialists to be determined by the needs of the patient. Primary consideration was given the four major disciplines: medical, psychological, social, and vocational; however, there was an additional and long list of minor disciplines any one or more of which might become important if needed by the patient.

After the initial presentation emphasizing the program within the facility, for many months the major consideration related to *how* the rehabilitation center—a *building*—should be planned to house the services for disabled persons needing rehabilitation.

By the end of 1956, the primary interest shifted from building a facility to the growth of the concept

that a rehabilitation program could be developed any place if there could be medical, psychological, social, and vocational evaluation of the patient. At that time, it was not apparent to me that I was travelling and confined within a special public interested in physical medicine and rehabilitation. I did not know that when I walked without the confines of that public, even though I was within a hospital public, there might be little or no understanding of rehabilitation and its many disciplines, needs for which are never known until the patient receives each of many total evaluations.

Two years ago, when a young certified corrective therapist with training as a director-coordinator of a Physical Medicine and Rehabilitation Department came to our hospital and proposed a rehabilitation program, it was like meeting an old friend. It was an interesting idea, also. Could a department of physical medicine and rehabilitation be developed in a small hospital? Would a quality program in a small general hospital be practical in our community? We knew it would be necessary to purchase three of our four major disciplines. Whether the total evaluation of the patient would reveal needs for services beyond our limited ones, there was no way to know, but we were willing to proceed slowly and frugally until that time when we would have to admit defeat or declare our success. The expenditures had to be kept nominal for this pioneering project, but they were justified and approved because we all sincerely believed, and still do that every patient in any hospital may have need for one or more phases of the physical medicine and rehabilitation services. Our Founder, Dr. Thomas A. Drummond, and our Governing Board encouraged us in our project. After two years, we are not defeated, and we have experienced some gratifying successes in patient care.

Of course the inpatient rehabilitation program poses problems in the hospital. During the early weeks of caring for the completely helpless patient, the Nursing Service is taxed. Today, we recognize and understand these problems but recognition and understanding do not solve problems. The answer is not in the Administrator's office—it is on the floor, and we look forward to special meetings to solve patient-management problems. A few minor changes

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in our building are still necessary to provide proper bathroom facilities and a recreation area for our rehabilitation patients.

Providing and integrating the purchased services needed by the patient but which are not actually provided within our facility is perhaps the greatest problem we face, but the director-coordinator of the rehabilitation program plays an important role in this phase of our program. Should one list these things as problems? I prefer to remember that they were the original challenges we accepted in developing the service and we look at them as routine—they are being approached as day to day challenges in providing a service which we all believe our patients should have, if and when needed.

The primary inpatient management responsibilities for our rehabilitation program in a small general hospital have been established (1) to provide the rehabilitation discipline or disciplines needed by all patients hospitalized; (2) to provide a small quality program of services to the local industrial accident patients and geriatric patients to implement the specialized rehabilitation centers, by carrying out a continued rehabilitation program for patients still needing physical medicine and rehabilitation services but who no longer need all disciplines at all times; and (3) to control costs of the department to insure a continued economic quality service for which community needs are increasing daily.

What is happening to the Profit and Loss Statement of the department? It is holding its own but when several of our best performances have been repeated a sufficient number of times to become recognized by the insurance companies paying compensation to injured employees, we know our program will be recognized and utilized to its fullest extent. The same performances are already being recognized by the social welfare departments exhibited by their interest in the revocationalizing of welfare fund recipients. This being true, we are confident the department income will be stable.

It has been interesting to watch the development of the various disciplines, whether they are the original major or minor disciplines. Recent developments in the Hill-Burton Program indicate the possibility of special vocational rehabilitation facilities—probably one to serve each Region of the United States (California begin in Region IX). The facility would serve California, Washington, Oregon, Arizona, Nevada, Alaska and Hawaii.

In establishing departments of physical medicine and rehabilitation and specialized sections within the departments of rehabilitation such as certified corrective therapist section separate from the phy-

sical therapy section, hospital administrators need assistance to define the differences between disciplines involved.

Communications prepared for the administrators for such assistance should be sufficiently informative to be recognized as education that there is a separate and important patient need for each discipline which should be provided. This selling to hospital administrators of the professional services as distinct and separate disciplines may best be done through the medical director of the physical medicine and rehabilitation department. However, this might not necessarily always be true.

Few hospital administrators have the unique experience of having been involved in rehabilitation programs sufficiently to appreciate the importance of the utilization of the four major disciplines as well as some of the conflicts which developed in defining responsibilities of vocational rehabilitation services in relation to other services and the responsibilities of physical therapists in relation to other services, and also to experience first hand the role of a certified corrective therapist as director-coordinator of a physical medicine and rehabilitation program.

I am sincere when I say that I do not believe the program at our small hospital would have been possible without our certified corrective therapist,\* as director-coordinator of the program. He was well indoctrinated in the importance of the team approach to the rehabilitation patient. He knew we had to provide medical, psychological, social, and vocational evaluation of the patient. In addition, recognition of the needs of the various disciplines, and making arrangements for such disciplines so that little or no time was lost when the doctor prescribed such need, could only have been possible with the training and background of the certified corrective therapist as a director-coordinator of the physical medicine and rehabilitation program.

As a group, I commend the corrective therapists for their worthwhile endeavors and urge them to continue the pioneering work in their field to gain the recognition they deserve and which we need. I hope our pioneering in physical medicine and rehabilitation in a small hospital will be successful. If so, it may be another avenue to help clarify to other hospital administrators the importance of the various disciplines being provided when needed.

In conclusion, I must state emphatically that hospital administrators establishing departments of physical medicine and rehabilitation should become

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\*Charles Willhite

# THE 'LOST HAND' IN HEMIPLEGIA

WILLIAM W. ZACHARSKI\*

Rehabilitation of the affected upper extremity in the hemiplegic is a constant source of frustration to the therapist. Frequently the patient looks out of a window or shows total disinterest during an exercise which involves that extremity, whereas exercise, to be effective, requires the patient's full attention. The patient often neglects to carry out instructions for exercise to be done away from the clinic despite his claims that he has exercised the arm almost constantly. He fails to use the extremity advantageously regardless of how much function is restored; he is often seen walking with the affected arm hanging uselessly at his side. However, in the clinic, under direction, the same individual can perform almost any assigned task.

This inattention phenomenon is not solely due to wilful neglect on the part of the patient. The loss or damping of sensory and motor responses, a direct result of neurological damage, may be associated with diminished consciousness of the affected extremities. To the patient, the paralyzed side seems not to exist. This phenomenon of non-existence of the part is common in hemiplegia of recent origin and before return of function in the affected extremities. As the muscles begin to respond to use, the patient's interest in or consciousness of the neglected parts increases. At the same time, it is assumed, the edema or trauma in the area of the lesion subsides. But the return of awareness of the extremities does not grow on a par with the return of potential function.

The majority of all patients with recent cerebral accidents often neglect to remove their lower extremities from the foot rest of the wheelchair when preparing to stand in the walking ramp. The patient sometimes tries to take two steps with his normal leg, forgetting that he did not make a step with the affected one. The fact that hemiplegics seldom look toward their affected side, unless attention is called to it, again points to lack of consciousness of that area. Here are patients' remarks which point up the previous remarks:

"I can hold on to the pulleys now without watching my hand. That was my big trouble before. I would hold to the pulley for awhile and then forget all about the hand and the pulley would fall from my hand."

"I was washing my face yesterday, and to my surprise, my bad hand came up to help. My first impression was that it was someone else trying to help me."

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"I work with my hand whenever I remember it. Often I forget the hand, unless it begins to hurt or get in my way. When you can't feel something, how can you know it's there?"

The problem of making the patient aware of the extremity requires considerable tact on the part of the therapist. Rapport with the patient can easily be lost by insisting that he exercise his arm when away from the clinic. The greater the pressure placed upon the patient, the more he will insist that he "exercises the extremity all day." This can only lead to a breakdown of good patient-therapist relationship.

All members of the therapeutic team should be familiar with this problem and encourage, not pressure, the patient to use the extremity. Such encouragement should concern only tasks well within the patient's ability. The therapist must see to it that the small tasks, maneuvers and exercises gradually, if insidiously, keep pace with the patient's returning ability. He must be prepared to find some patients' recovery to be slow, halting or seemingly permanently arrested. But he must also make the good learner aware of his accomplishment and lead him to realize in his recreation and at mealtime, as well as in his therapy, the pleasure to be had from a well functioning body part.

## VA COOPERATING IN NATIONAL TB CAMPAIGN

The Veterans Administration will cooperate fully in the new national campaign to eradicate tuberculosis in this country, according to Dr. William B. Tucker, director of pulmonary disease service for the VA in Washington, D. C. The campaign was announced recently at the Arden House Conference in Harriman, N. Y., co-sponsored by the Public Health Service and the National Tuberculosis Association.

Dr. Tucker said the VA's role will be one of research and care of patients since the agency has no direct responsibility for public health measures. In accordance with the Arden House Conference recommendations, intensification of the VA's treatment program will make a large contribution toward control of the disease.

The VA also will continue its major research program for study of drug treatment for tuberculosis and other pulmonary diseases in cooperation with the Armed Forces; will continue studies on psychological factors that influence success of treatment for TB more than do drugs in many cases, and will attempt to develop a better vaccine for TB.

The VA-Armed Forces cooperative research has tested the anti-tuberculosis drugs for general use as these have been developed during the past 14 years. Dr. Tucker said increasing numbers of these studies are being devoted to pulmonary diseases other than TB, as the new drugs aid in conquest of tuberculosis.

While the VA hospital load of TB patients has declined steadily since 1955, the number of patients with other pulmonary diseases in VA hospitals has risen.

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*"From  
Other  
Journals"*

Unless noted otherwise, all abstracts have been prepared by Philip J. Rasch, Ph.D.

J. E. Miller, Javelin Thrower's Elbow. *Journal of Bone and Joint Surgery*, 42-B:788-792, November, 1960.

Javelin thrower's elbow is characterized by tenderness in the medial ligament, usually over the medial epicondyle, and, less commonly, over the ulnar attachment of the ligament during or after throwing. There is a full range of painless movement and resisted effort of the elbow and wrist does not reproduce symptoms. The signs normally disappear with rest. The cause appears to be associated with imperfect throwing technique in which momentum is imparted to the javelin with a short quick jerk rather than with a smooth movement. The two types of arm motion in general use result in two different types of injury. The "side arm" technique may result in trauma to the medial ligament of the elbow; hydrocortisone may produce partial or complete relief. A thrower employing the proper technique may (rarely) injure the tip of the olecranon process against the olecranon fossa; excision of the fragment completely relieves the symptoms. It is necessary that the beginner receive proper coaching; bad technique, once established, is difficult to correct.

Marie L. Carns, et al., Segmental Volume Reduction by Localized Versus Generalized Exercise. *Human Biology*, 32:370-376, December, 1960.

Overweight women students at the University of Wisconsin were divided into three groups. Group I received localized exercises for the hip and abdominal muscles. Group II was given generalized exercises for the whole body. Both groups were placed on a diet averaging 2070 calories daily. Group III served as controls. Changes in body mass were measured by changes in weight and in segmental volumes. At the end of eight weeks both experimental groups had achieved a reduction in body weight and in hip volume. No differential effect attributable to spot exercise could be observed. The control group showed no reductions.

A. Stradel, Tightening Slack Lateral Ligaments of the Knee Joint by Means of Coagulen Injections. *Sportärztliche Praxis*, 3:23-25, March, 1960.

Lateral knee ligaments may become loosened by stretching, particularly in football and skiing. Injection of 1 to 1½ cc coagulen (a hemostatic preparation containing thrombo-plastic substances) directly into the ligaments in three or four places on five or six occasions over three or four weeks time causes the ligament to become firm and increases the weight bearing capacity of the knee joint.

John H. Menkes, Normalcy and the Gamma Efferent System. *Lancet*, 7165:1394-1395, 24 December 1960.

Normalcy may be defined as the correct responses to stimuli. Sullivan states two receptor systems are particularly important in establishing interpersonal relationships: touch and hearing. Some of the trac's involved are part of the gamma efferent system. An overactive gamma efferent system is the usual result of sensory deprivation; underactivity of the system may make a subject immune to external stimulation. Thus disproportionality between the input and output of this system may be responsible for deviations from normalcy. Schizophrenic reactions may be due to the disruption of some of the vital relay systems by non-conforming neurones.

W. R. Keatinge, The Effect of Work and Clothing on the Maintenance of the Body Temperature in Water. *Quarterly Journal of Experimental Physiology and Cognate Medical Sciences*, 46:69-82, January, 1961.

Experience in the last war showed that cold, rather than drowning, was the main hazard to life after shipwreck in cold and temperate waters. In this study 12 naval volunteers were immersed in water at a wide range of temperature to determine whether non-waterproof clothing and/or physical exertion helps maintain body temperature. There were some differences, depending on the temperature of the water, but, in general, clothing reduced the fall in rectal temperature both when the men worked and when they remained still. Physical exertion accelerated the rate at which the men's rectal temperatures fell, presumably due to the fact that exercise increased the loss of heat from the central part of the body to the muscles more than it increased heat production.

P. Cane, and C. Ciuccarelli, Trauma from Ice Hockey. *Medicina Sportiva*, XIV:262-272, May, 1960.

Trauma in ice hockey as encountered by the authors occurred in 0.8% of all individual performance. One hundred forty cases were surveyed. The affected regions of the body in decreasing order of frequency are: head, upper extremity, hip, elbow. The mechanisms of trauma in decreasing order of frequency are: fall, vertebral disc shock, player impact, stick injury.

Contusion is the most common occurrence; lacerations, sprains, fractures, and luxations follow in order. Most injuries are of limited import; nevertheless considering that almost 1% of the injuries involved fracture, contusion, or concussion of the cranium, the authors feel steps ought to be taken toward making this sport a safer one. (Translated and abstracted by M. Rubino.)

Gerald J. Duffner, Scuba Diving Injuries. *Journal of the American Medical Association*, 175:375-378, February 4, 1961.

It is mandatory that every practitioner have some familiarity with the prevention and treatment of diving injuries. The cause of all diver's difficulties is that air is compressible and water is incompressible. During the descent the diver's respiratory mixture must be increased by an amount equal to the increase in pressure and the air containing spaces of the body must equalize the pressure. Increasing the partial pressure of the atmospheric constituents can produce harmful effects. On the bottom nitrogen dissolves in body fluids and tissues. In addition the air-containing spaces of the body become filled with compressed air. The most serious results of pressure reduction occur from expansion of air in the lungs. The diver must exhale continuously during any rapid ascent. Chronic chest diseases, poor physical condition, and obesity predispose divers to injury. Individuals with these conditions should be discouraged from participating in Scuba diving.

Irma Astrand, et al., Circulatory and Respiratory Adaptation to Severe Muscular Work. *Acta Physiologica Scandinavica*, 50:254-258, 1960.

Detailed information is needed regarding the reaction of the human organism during severe muscular work where part of the energy has to be delivered by anaerobic processes and where an increasing concentration of lactic acid limits the duration of work. One well trained male subject exercised on an ergocycle for different periods of time at a standard workload of 2,160 kpm/min. Heart rate, pulmonary ventilation, and oxygen uptake reached identical values at a given time after the start of work. The blood lactic acid concentration indicated that 9 min. of work of this intensity was the limit which could be tolerated. The day-to-day variation in heart rate reaction to muscular exercise with sub-maximal work loads is very small. Changes in heart rate response can usually be explained by the effects of dehydration, infections, etc. and are usually reflected in performance. Competitors are usually tense before competition and relaxed afterwards. This mental state does not appear to affect the heart rate.

C. Lasi, Traumatic Dislocation (Luxation) of the Fibular Head in a Discus Thrower. *Medicina Sportiva*, XIV:295-300, May, 1960.

Dislocation of the proximal tibio-peroneal articulation is extremely rare, but is typical of parachutists. This injury, made possible by the laceration of the articular capsule, is most commonly anterior. The injury is produced by an extrinsic force (ex. gravity) acting simultaneously with an intrinsic force (i.e. a sudden violent muscular contraction).

The diagnosis is easily made. The athlete complains of severe pain producing functional inactivity; on inspection the peroneal head is seen laterally or in the popliteal fossa; palpation is extremely painful and gives evidence of a dislocated, quite movable head. Treatment consists of early reduction with immobilization through casting. (Translated and abstracted by M. Rubino.)

F. Flores, Supramalleolar Fracture of the Fibula from a Singular Mechanism in Greco-Roman Wrestling. *Medicina Sportiva*, XIV:471-475, August, 1960.

Unlike boxing or other types of ring competition, Greco-Roman wrestling has never been cited in medical sport literature as an etiologic factor in typical sport trauma. Though Greco-Roman wrestling often gives rise to abrasivo-contusive injuries of the arms, face and nose, it rarely leads to supramalleolar fracture of the fibula.

In the patient treated by the author, the fracture was due to compression-internal rotation of a bent leg on a forward foot that was caught and immobilized in the wrinkled mat cover.

The author suggests that this type of injury might be prevented by the use of an inflatable rubber mat in place of the conventional type. (Translated and abstracted by M. Rubino.)

Henry Blackburn, Josef Brozek, and Henry L. Taylor, Common Circulatory Measurements in Smokers and Non-smokers. *Circulation*, XXII:1112-1124, December, 1960.

No convincing theoretical or experimental basis has been established for data showing higher cardiovascular mortality rates in smokers than in non-smokers. The acute effects of smoking on circulation are reflected in increased pulse rate and arterial blood pressure and reduced peripheral blood flow. There is no evidence for a direct influence of smoking on atherosclerosis or thrombogenesis. This paper is concerned with resting pulse rate and blood pressure and circulatory reactions to several pressor stimuli in chronic smokers and non-smokers. Acute effects of smoking have been largely eliminated.

Relative bodyweight is lower in heavy smokers than in non-smokers, and basal oxygen consumption is slightly higher. No differences in resting blood pressures are found. In broader studies smoking is associated with lower systolic and diastolic pressures. In smokers there is a diminished diastolic pressure response to cold and possibly a greater systolic response to carbon dioxide.

Research associations do not provide evidence for important differences in circulatory reactivity between smokers and non-smokers. There is little evidence for deterioration of cardiovascular "fitness" in smokers performing work tests. It is not possible to give serious consideration to these circulatory phenomena as significant underlying causes of increased cardiovascular mortality rate among smokers.

Alan J. Berry and T. K. Cureton, Warm-Up Studies in Athletics. (Urbana: University of Illinois, n.d. Mimeo-graphed, 8 pp.)

The problem of the use of preliminary work to produce physiologically warmup and its effect on ensuing performance has proven difficult to solve. A review of the literature and studies conducted at the University of Illinois suggest that a long, progressively intensified warm-up improves performance provided the subject is fit for long-sustained effort. The number of variables involved—length of warm-up, its intensity, the rest period between warm-up and performance, type of event, performer's level of fitness, performer's body type, nature of the physical and psychological environment—make the study of this problem elusive.

U. Nicosia and G. Parenti, Skating Injuries. *Medicina Sportiva*, XIV: 273-279, May, 1960.

This study of ice skating is based on 139 cases which occurred between 1938 and 1949. The order of frequency is as follows: fractures (36%), sprains (34%), lacerations (24%), cerebral contusions (3%), luxations (2%). The occurrence was equal in the two sexes.

Lacerations of the face, fractures of the distal radius and knee sprains were the most common; fractures of the distal radius predominated by far.

The most common cause was a fall on the ice; direct injury from the skate was a close second. (Translated and abstracted by M. Rubino.)

U. Nicosia, Traumatic Injury of the Hand in Skiers. *Medicina Sportiva*, XIV:280-287, May, 1960.

Most of the traumatic injuries of the upper extremity in skiers occur on snow which has iced. Environmental temperature seems also to play a big part, since four times as many injuries occur in the early morning hours as in the warmer hours of the day. Of the 115 injuries of the hand studied by the author, 61 were subluxations, 46 were fractures, 8 were luxations.

Most injuries involved the metacarpophalangeal bones of the thumb. Consideration of the mechanism of injury is also discussed to some length by the author.

Therapy comprises the use of aluminum splints and casting with traction. (Translated and abstracted by M. Rubino.)

Robert Lou Clifton, Effect of Weight Training Upon Accuracy in Shooting Field Goals in Basketball. (Unpublished Master's Thesis, State University of Iowa, August, 1955.)

Six members of the freshman basketball team at the State University of Iowa served as controls. Eight others practiced weight-training in addition to their basketball training program. The weight-training program had no effect upon the participants' accuracy in the shooting of field goals.

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sufficiently indoctrinated in the field to guarantee that all patients will receive total evaluation and, guarantee also that through such total evaluation all therapies needed by the patient are provided. These guarantees cannot be given unless all disciplines are recognized by the major physical medicine and rehabilitation team; otherwise such departments will exist in name only.

## Students Corner

EDITOR'S NOTE—Students, particularly those majoring in Rehabilitation or Corrective Physical Education, are invited to contribute to this column.

### THE ORGANIZATION OF THE SCHOOL PHYSICAL REHABILITATION PROGRAM

This paper is written for the administrative staff of the public schools to help organize a corrective physical rehabilitation program within its curriculum. I shall discuss the role of the corrective teacher and the basic objectives desired of the program.

The handicapped among us are a challenge to the best resources of our medical and social sciences and a responsibility that must be recognized and met in terms of service from public and private agencies. At present, complete rehabilitation is available to only a small percentage of persons who need this service. It is not too much to believe that the ideal of rehabilitation—total rehabilitation of the entire group of disabled—will become a reality in the not-too-distant future. For assurance, the most probable place for rehabilitation outside of the hospital system would be in the public schools.

There are many hospitals and agencies or organizations which have definite corrective programs for the disabled, mentally ill, handicapped and convalescent. But what about the crippled child with congenital or acquired deformities? There are many half-hearted movements of charity and limited governmental aid for these children. But, is this enough? Surely the schools could help make these children potential productive citizens by supervising the important transition from childhood to adolescence and adulthood.

According to Symonds (1) the school's role would be as follows:

The school can no longer consider itself merely as an academic institution where children learn reading, writing, arithmetic, geography and history, which traditionally have made up the subject matter of the school's curriculum. The whole child comes to school, and the school is responsible for the child as a whole while in school, not just the academic child but the child who must learn to live as a social being in a social environment.

The crippled child should be given every benefit of the modern advances of medicine and of rehabilitation. He should not be retarded in his education. As soon as possible, the child should be put in a normal school environment so that he does not suffer from the feeling of being different. This is the beginning of the school rehabilitation program.

Garrison (2) speaks of the responsibility of the schools to crippled children:

The aim of a special education program for crippled children should be to fit the individual to take his place in the social and economical world and to train him to apply his ability and knowledge to the highest degree of efficiency of which he is capable. Insofar as possible, the child should be placed in an environment filled with wholesome group fellowship and be given an opportunity to participate in group experience. The crippled child must be taught the rules of society and must come to realize that they are not going to be entirely altered to suit his special condition. The crippled child should not be dramatized, but should be treated in as normal a manner as possible. The goal will have been reached when every child has been given the opportunity to develop to the fullest those abilities that they possess and are administered to in terms of their individual needs and abilities.

The administration of the school program for physical rehabilitation, begins with the setting up and execution of definite, understandable, and practical objectives and policies. The corrective teacher should be responsible for suggesting the objectives and policies for the rehabilitation program which will be an entity within the physical education department.

A policy will not be a definite set of rules. Instead, it will be a definite procedure which may be changed if necessary to accomplish certain objectives desired of different pupils. Such a policy should always be based on sound educational principles, conforming to the latest medical theories and to the recommendations of the physicians. The interpretation of the policies should rest in the hands of the school corrective teacher.

The success of the program depends on the corrective teacher. Part of this success will come when the corrective teacher has the complete confidence of the head administrator and other school authorities. Such confidence can easily be gained if the corrective teacher is properly trained, has excellent character, and will advocate policy deviation only for the good of the pupils.

The corrective teacher should educate the rest of the school faculty about the rehabilitation program. He should emphasize those things that can be stressed in the various subjects to which each pupil will be exposed. He should explain to the faculty the value of understanding, encouragement, and acceptance to the handicapped child.

Before any rehabilitation program can begin, professional medical advice is necessary for each pupil. The rehabilitation teacher is the interpreter for the physician and must cooperate to achieve the desired results by making certain that the doctor's recommendations are followed. The teacher should not diagnose a physical handicap under any circumstances. The physician makes the diagnosis and the

recommendations; the corrective teacher sees that they are carried out and followed.

Every program should have the principal aim that all children, regardless of the type of their defect, have the opportunity to participate in some phase of physical education. The general objectives of the program should be the detection of those children with physical and mental deviations and the development of these individuals for a full life within the limits of their physical capabilities.

Clark (3) states that specific functions of a rehabilitation program might include the following:

1. General developmental and conditioning activities for individuals with low physical fitness to improve endurance and exercise tolerance.
2. Training of body mechanics for individuals with non-pathological conditions.
3. Adaption of physical education and recreation for the handicapped.
4. Psychological and social adjustments of "normal" individuals with atypical tendencies.
5. Relaxation activities for individuals suffering from chronic fatigue and neuromuscular hypertension.
6. Selected procedures for improving motor techniques of awkward individuals.
7. Counseling, guidance, and assistance with physical fitness, personal adjustment, and social problems.

All physical activity is limited by the ability of the particular child and his ability is limited by his deviations. Every activity should be considered by what it claims to do and if it meets the needs of the pupil.

I have tried to discuss the requirements for organizing a corrective rehabilitation program in a school system. The most important part is the corrective teacher. Through his work and organization, the administrative policies of the program can be fitted into the regular school program and carried out with the greatest efficiency.

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## Book Reviews

**School Health and Health Education, 4th Edition**, by C. E. Turner, C. M. Sellery, and Sara L. Smith. (St. Louis: C. V. Mosby Company, 1961, 481 pp., \$5.00.)

This is a text for health teachers and school health personnel, and the emphasis is on the administrative aspects of the subject. There is a chapter on the contributions of physical education, and the physical educator is considered as part of the school health team, along with the school administrator, the classroom teacher, and the school nurse and physician. Beginning teachers will find the chapters on resource materials and on evaluation especially worthwhile, and an appendix lists specific health education objectives as they relate to fifteen different topics. The book is well written, appropriately illustrated, contains adequate references, and is sensibly organized. For example, the various aspects of the "well child" are discussed and then physical defects are noted as deviations from the norm. Unfortunately, items such as cigarette smoking, alcohol, and cancer are not discussed, nor is the role of the health education team in combating the use of habit-forming drugs by high school students covered.

On the whole, this text will be found to be a very useful reference for the teacher or administrator of school health education.

WRP

**Das Schadelhirntrauma (The skull-brain trauma)** by M. Klingler. (Stuttgart: Georg Thieme Verlag, 1961, 176 pp. \$4.70.)

In the preface to this book Prof. Dr. R. Nissen states that about half of all traffic accidents result now in severe injuries to the skull and that 2/3 of such injuries are fatal. In order to better understand, diagnose and treat such injuries, the author, Priv.-Doz. Dr. M. Klingler discusses first the possible damages done to skull and brain tissues. He further describes the tools at hand with which to determine the location and extent of the brain damage.

Forty-one patients, their injuries, and resulting recovery problems and rehabilitation difficulties are registered in detail. The author warns that many symptoms and difficulties may appear or re-appear after the apparent recovery of some of the patients.

A chapter is also dedicated to the care and treatment of unconscious patients and to people with resulting epileptic seizures. The author discusses the necessity of the organization and management of a "ward of intensive care" which in his opinion may save lives or prevent prolonged invalidism.

Nineteen interesting illustrations support the highly technical text. References to related world literature on the subject conclude the discussion in the book.

RK

**An Inventory of Social and Economic Research in Health, Ninth Edition.** (New York: Health Information Foundation, 1960. 407 pp. Paper.)

As the title indicates, this annual bibliography falls somewhat outside of the area of primary concern to the corrective therapist. The three principal sections are "Studies Related to Health Levels," "Studies Related to Behavioral Aspects of Health," and "Studies Related to Health Resources and Economic Aspects of Health." The Association for Physical and Mental Rehabilitation does not appear among the organizations conducting research. For those working in the field with which it deals this should be an indispensable guide.

PJR

**Sportmedizin**, by Ernst Jokl. (Privately printed, 1957. 384 pp.) **Medicine and Sport**, by Ernst Jokl. (Privately printed, 1960, 184 pp.) **Research in Physical Education**, by Ernst Jokl. (Privately printed, 1960. 553 pp.)

The above three books are the start of a projected series of five volumes in which our distinguished Contributing Editor is bringing together his life's output of scientific publications. The three total some 1121 pages, and, of course, do not include the several books which he has written. The total is still further reduced by the fact that he has been unable to locate reprints of some of his papers!

Unfortunately for most of us, *Sportmedizin* is written entirely in German; this reviewer can say little more than that it is most impressive in appearance.

*Medicine and Sport* contains papers written since Dr. Jokl's arrival in the United States, and is almost entirely in English. Many of the articles will be familiar to the reader, as they originally appeared in this *Journal*, the *Journal of the Association for Health, Physical Education and Recreation*, the *Research Quarterly*, and similar periodicals; others, however, were originally presented in Britain, Finland, Australia, Italy, and elsewhere. Most of them deal with boxing, twins, ballistocardiography and other subjects in which the author is an internationally known authority.

To most of us *Research in Physical Education* is of the greatest value since this contains the work done during Dr. Jokl's life in South Africa. Consequently it includes reprints from the *South African Medical Journal*, *South African Journal of Medical Science*, *South African Journal of Science*, *South African Outlook*, *Acta Medica Orientalia* and other publications which are all but inaccessible to the ordinary student in this country. Fortunately indeed these are in English.

Most of us consider ourselves fortunate if we succeed in having a paper accepted for publication once in a while. We can only express our admiration of a scientist whose inexhaustible vitality and seemingly unlimited knowledge have enabled him to publish so extensively and so well in such a large number of areas. Long may he be spared to continue his work!

PJR

**The Tutoring of Brain-injured Mentally Retarded Children**, by James J. Gallagher. (Springfield, Illinois: Charles C. Thomas, 1960. pp. 194. \$6.75.)

This book is a report on an experimental study designed to test the effects of supervised tutoring upon the psychological and educational behavior patterns of institutionalized brain-injured and mentally retarded children. The details of the tutoring methods are preceded by an introductory chapter which reviews the literature and problems of the subject under discussion. The tone of this chapter is that the I.Q. is not a static quality and that many possibilities do exist for a more complete utilization of one's inherent mental capacities—*injury or no*.

The methods used in this study are quite clear. The results are encouraging. Some children do make significant progress while undergoing tutoring, especially children in the lower age groups. The implication is obvious.

NWF

**Psychological Techniques in Diagnosis and Evaluation** by Theodore C. Kahn and Martin B. Griffin. New York: Pergamon Press, 1960. Pp 164. \$6.50.)

To those who do not have an intimate knowledge of psychology but who, in the process of their reading or profession, come into contact with psychological evaluation, this book should fill a long-felt need. Clearly, step by step it provides an up-to-date review of psychological methodology. In ten chapters the book covers evaluation of normals, differential diagnosis, methods of testing intelligence, evaluation of organic brain impairment, identification of schizophrenia, assessment of neurosis, evaluation and testing of children, psychological tests in vocational and educational guidance, and in the final chapter methods of reporting the psychological findings.

For the general practitioner, the physician in the

specialty field, educator, social worker, lawyer, and probation officer this book will provide a ready reference for an improved understanding of psychological techniques as they are used as an adjunct to diagnosis. There is an adequate bibliography and a complete index.

DCI

**Behavior Therapy and the Neuroses**, edited by H. J. Eysenck. (New York: Pergamon Press, 1960. Pp 479. \$10.00.)

The premise of this symposium of articles is that rational treatment of neurotic disorders can only be developed by drawing on learning theory and treating neuroses as learned habits. Dr. Dysenck is definitely anti-psychanalytic, expressing his opinion that psychoanalytic concepts are not based on sound experimental conclusions. He feels the background for behavioral therapy, which is his term for conditioning or re-conditioning, renders it the method of choice in the treatment of the neuroses, because of research findings based upon varied applications of Pavlovian and Watsonian learning theory.

The volume consists of five major sections: I. Theoretical Bases and Classical Experiments; II. Reciprocal Inhibition Therapy; III. Therapy by Negative Practice and Conditional Inhibition; IV. Aversion Therapy; and V. Therapy by Positive Conditioning and Feedback Control. Multiple articles appearing under each of the above headings written by such authorities as Wolpe, Black, Meyer, Kendrick, Yates, Jones, Rayner, Walton, Franks, Raymond, Liversedge, Sylvester, Beech, MacLaren, and Sayers cover the area of theoretical and clinical application of learning theory as a therapy for maladaptive behavior.

Primarily a reference source, this book provides an excellent background and explanation of learning theory and its application. Author index, and subject index are adequate.

DCI

**Curves by Bruce**, by George Bruce. (Van Nuys: Privately printed, 1959. 52 pp. Paper. \$1.95.)

There is an old saying that you can't argue with success. It would take a bold reviewer indeed to criticize this how-to-do-it manual published by a man whose pupils have won over 1,000 beauty queen titles. Nevertheless it does seem that the reader has to wade through an unnecessarily large number of pages devoted to testimonial and pictures of successful students (not that the latter is a chore!) in order to arrive at the essence. The basis of Bruce's program appears to be progressive resistance exercise with light dumbbells. Illustrations of the exercises, exercise charts, and dietary hints are included. The goal seems to be a bust the same size as the hips and a waist approximately 14 inches smaller than either. The prospective purchaser would probably appreciate more information on how to attain these and less on those who have already done so.

PJR

**Das Klapsche Kriechverfahren**, (The Klapp Crawling Method), fourth edition, by Bernard Klapp. (Stuttgart: Georg Thieme Verlag, 1961. In the USA and Canada: New York: Intercontinental Medical Book Corp. 88 pp. \$3.20).

The fourth edition of *The Klapp Crawling Method* is essentially the same as the third edition. (See this *Journal*, January–February, 1959.) In the preface, it is stated that the last edition was translated into French and that the Klapp Crawling Method is being more and more recognized and used, nationally and internationally. Questions are raised concerning correct body posture as used for therapeutic and/or prophylactic methods, and for certain thoracic deformities. Are they symptomatic or idiopathic? Where is the line of demarcation? It will take quite some time and considerable research to find the answers.

However, the apparently remarkable results achieved with the Klapp Crawling Method, which emphasizes reduction of weight on the spinal column by crawling exercises promises that full recovery of certain deformities is possible.

RK

**The Pathology of Cerebral Palsy**, by Abraham Towbin. (Springfield, Illinois: Charles C. Thomas, 1960. 206 pp. \$8.00.)

The current emphasis on the handicapped individual and the fact that possibly as many as one-half million individuals in the United States alone suffer from cerebral palsy make the need for study of the pathology of this medical problem apparent. Towbin declares that a proper understanding of pathogenesis is essential to establishing enlightened principles of prevention as well as of prognosis and treatment. He relates pathology of cerebral palsy and then defines and classifies the problem pathologically as well as clinically. The systemic disturbances of the fetus and newborn which produce brain lesions of cerebral palsy are covered widely and adequately for comprehensive understanding. These, as well as those of local effect, hemorrhage, infections, and the more rare causes, are illustrated with case histories, as well as with 73 photographs demonstrating brain pathology micro- and macroscopically.

This book should prove of great value for anyone dealing with the problem of cerebral palsy. It seems especially appropriate for those training in the area of physical medicine and rehabilitation, although neurologists and pathologists will find it useful.

MLB

**A Medical Handbook for Athletic and Football Club Trainers**, by W. D. Jarvis. (London: Faber and Faber, Ltd., 1950. 144 pp. \$1.52.)

The role of the trainer is apparently quite different in Great Britain than in the United States. Medical personnel are not so evident at athletic contests and the trainer is allowed greater freedom in medical matters. The lack of a drugstore in every hamlet also means that the trainer must often concoct his own medicaments. The closest U.S. counterparts of the British football (soccer) and small athletic clubs are probably the "bush league" baseball and semi-pro football teams, so this *Medical Handbook* would probably find a rather small audience here.

The book contains chapters on elementary anatomy and physiology; injuries of bones and joints; injuries of other tissues; anatomy, functions, and injuries of the foot; massage, manipulation, hydrotherapy, and active movement; actinotherapy and medical electricity; minor ailments; diet, and drugs and dressings. This last makes for an interesting comparison with those of the U.S. training room.

WRP

## Chapter Activities

### Calif.-Nevada Chapter

The Calif.-Nevada Chapter co-sponsored a Physical Fitness Workshop and Institute at the University of California, Los Angeles on March 11 with the Department of Physical Education of the host university and the Corrective Physical Education Section of the Los Angeles City Board of Education. The workshop was conducted in cooperation with the School of Medicine, University of California and the V.A. Center, both of Los Angeles.

William Koos, vice president of the local chapter, acted as chairman of the program which included a panel discussion on "Proposed Deletion of Physical Education Requirement in California Schools and its Effect on the Citizenry" moderated by Louis C. Riess and including as participants, Dr. Daniel W. Calvin, Dr. William Fowler, Prof. Evelyn Loewenthal and Walter Crowe, Ph.D.

A workshop on "Administration of School and Hospital Corrective Clinics" had Harold J. Brenner, presiding and Dr. Lloyd H. Thee, Jr. and Dr. Charles O. Bechtol as leaders.

A discussion group led by Richard G. Fowler concerned itself with "Academic and Clinical Preparation for Adapted Physical Education and Corrective Therapy." Discussants included Ivan W. Swisher, Ed.D. and Bernard H. Weber.

## News and Comments

### EVALUATE DRUGS IN TREATING MENTAL ILLNESS

Veterans Administration hospitals have begun a large-scale evaluation of six drugs used in treatment of mental illness. More than 500 schizophrenic patients newly admitted to 36 hospitals will be involved in the 24-week, controlled study. The project is designed to yield information on the relative effectiveness and suitability of the drugs for patients of this sort, so as to enable doctors to improve treatment for schizophrenia.

It is part of the VA's continuing cooperative research program to evaluate newer drugs in the treatment of mental illness and is the sixth such large-scale project in VA hospitals since the program began four years ago. The drugs under evaluation in the new study (chlorpromazine, fluphenazine, reserpine, thioridazine, chlorprothixene, and trifluoperazine) are representative of a wide spectrum of the various psychopharmacologic agents.

### PARAPLEGIC COMPLETES SEVENTH YEAR OF EMPLOYMENT

Add 44-year-old Clarence E. Miller of Broken Bow, Oklahoma, to the honored list of disabled World War II veterans who have triumphed over battle disabilities and made good in today's industry. Paralyzed from the waist down, Miller has recently completed seven years as an expert instrument repairman for Spartan Aircraft Company in Tulsa.

Sixteen years ago Miller's prospects were grim. A platoon sergeant in the 91st Infantry Division, he had been felled by a German sniper's bullet in Italy's Po Valley. Thus began his new fight, first one of survival, then one of adjustment to the life of a paraplegic. A farm worker in pre-war life, Miller after long hospitalization, was placed in training through VA officials at the Muskogee Regional Office. He made rapid progress and his efforts led to his big chance by Spartan.

Miller's home at Broken Bow, near Tulsa, was specially-built for a paraplegic under VA direction. He also drives a car operated only by manual controls.

One of Miller's prize trophies is a giant sailfish (6 feet, 6 inches long) which he snared off the Florida Keys three summers ago. Says Miller: "It's very seldom a guy's so bad off he can't do something."

### SEMINARS ORIENT COMMUNITY TO EMPLOYMENT PROBLEMS OF EX-MENTAL PATIENTS

Veterans Administration hospital seminars are helping acquaint representatives of business, industry, and civic organizations with employment of former mental patients.

An all-day seminar at the Gulfport, Miss., VA hospital, for example, recently brought together guests from the Chamber of Commerce, Goodwill Industries, the State Employment Service, Glenbrook Laboratories, Williams Pecan Company, the Mississippi Power Company, Salloum's Toggery, the Gulfport Port Commission, Lions, Civitan, and Rotary Clubs, Keesler Air Force Base, the Good Samaritan Training Center, and the United Gas Corporation.

Dr. L. B. Lamm, director of professional services at the Gulfport VA hospital, traced the history of treatment of mental illness, contrasting earlier concepts with present-day therapeutic processes. He also commended the community for its support of the hospital through the VA Voluntary Service and community placement programs.

The guests toured every type of ward in the hospital. They also visited the physical medicine and rehabilitation shops where patients do sheet metal work, radio and TV repair, and carpentry, operate various industrial machines, and tend a greenhouse.

## NEW SMEAR TEST SCREENS FOR MOUTH CANCER

Successful use of an easy and painless test for mouth cancer that could save many lives has been reported by Veterans Administration dentists. The technique is an extension of the Papanicolaou smear used for the detection of uterine cancer. The smear test for early detection of mouth cancer has been under study by the dental services of 12 VA hospitals and outpatient clinics for slightly more than a year.

The method consists of scraping cells from the surface of the suspect mouth tissue with a wooden tongue depressor, spreading the cells on a glass slide, staining them, and examining them under a microscope. When evidence of possible cancer is found, the diagnosis is then confirmed by biopsy, in which a small section of tissue is removed surgically. Dr. Henry C. Sandler, chief of dental service at the Brooklyn, N. Y., VA hospital, is chairman of the VA cooperative study.

Recognition of very early mouth cancer has been difficult because mouth abnormalities are quite common and biopsies are not taken routinely unless there is a suspicion of cancer.

Cell scrapings can be taken from every mouth abnormality without inconvenience to the patient and may turn up unsuspected cases of mouth cancer in time to save lives. The accuracy of this screening technique complements and supports very favorably the results of actual biopsies, and the smear test is no more painful than scraping a fingernail across the skin of the arm.

At a recent conference for the VA study, held at the Brooklyn VA hospital, the 12 participating VA dental services reported 147 mouth cancers have been found during the first year of the study. Most of these were clinically suspicious when first seen and probably would have been detected by direct biopsy.

There were 15 patients, however, who showed no clinical evidence of cancer. Their cancers were completely unsuspected and were discovered by means of scrapings from surface tissue. When the smear test revealed suspicion of cancer, biopsy which would not otherwise have been done confirmed the diagnosis of cancer of the mouth.

Among the participants in the conference were Dr. George N. Papanicolaou of Cornell University Medical School, who is the originator of the cytological technique; Dr. Leopold Koss of Memorial Cancer Hospital, New York City; and Dr. Lester R. Cahn, professor of oral pathology at Columbia University.

The dental services participating in the study are those of the Brooklyn, Bronx, New York City, Buffalo, and Montrose, N.Y., VA hospitals; the Brooklyn, N.Y., and New York City regional office VA outpatient clinics; the East Orange, N.J., Philadelphia, Pa., West Haven, Conn., and Wood, Wis., VA hospitals, and the veterans benefits office outpatient clinic in Washington, D. C.

## MENTAL HEALTH ASSOC. APPOINTS RYAN

The appointment of Philip E. Ryan as Executive Director of the National Association for Mental Health has been announced by Mrs. A. Felix du Pont, Jr., president of the organization. Mr. Ryan, Executive Director of the National Health Council since 1953 will assume his new post May 1, 1961.

At the National Health Council, Mr. Ryan has been at the hub of the health movement for the past 7 years, helping national voluntary, governmental and professional health organizations work together in the common interest.

During World War II, Mr. Ryan directed the world-wide foreign war relief program of the American National Red Cross. He was director of Red Cross International activities until 1948 when he was appointed chief of the mission for the International Refugee Organization in the U.S. Zone of Germany.

In 1952, Mr. Ryan served in Korea as adviser on health, welfare and education in the U.S. Army civil assistance program.

## RESEARCH BEGUN ON ELECTRONIC MONITORING OF SURGERY

Master electronic systems for monitoring the condition of patients in surgery and recovery are being established on a research basis at five Veterans Administration hospitals, the VA has reported. Basically adaptations of space medicine instrumentation already proved practical to check on animal passengers in rocket nose cones, the surgical monitors will keep watch over heart and brain activity, pulse, respiration, temperature, blood pressure, and other body conditions to give doctors early warning of any threatening changes.

Dr. Lyndon E. Lee, Jr., who heads research in surgery for the VA from Washington, D. C., said he believes electronic monitoring can aid considerably in making the more complex surgical procedures safer for patients.

Master electronic surgical monitoring systems have been established at the Pittsburgh, Pa., VA general medical and surgical hospital and at the Boston, Mass., VA hospital. The Durham, N. C., and Coral Gables, Fla., VA hospitals are in stages of planning such monitors. At the Chicago, Ill., VA Research Hospital, Dr. John Lundy, chief of anesthesiology, is working for further refinement of specialized electronic recording and monitoring techniques.

The portable Pittsburgh monitor, developed under private contract, is an eight-channel instrument. Mounted in a special stanchion in the operating room ceiling where any member of the surgical team can refer to it during an operation, it continuously displays physiological data (from four channels) about the patient on an oscilloscope, which is similar to a television screen.

The instrument also permanently records information from all eight channels in front of the anesthesiologist and the surgeon.

Transistorized and other miniaturized components make the complicated instrument compact enough so that it can easily be moved about to follow the patient from the operating room to the recovery room. It can be remounted in another stanchion overhead in the recovery room or in the patient's room.

Only a single cable leads from the instrument to the patient, and the cable can stay attached to him wherever he goes.

The monitor at Boston is being developed through joint research of the Boston VA hospital with personnel of the Massachusetts Institute of Technology as an advisory group. Plug-in cables will make the instrument usable both in the operating room and the recovery room.

Dr. Lee said electronic monitors will be valuable for the increasingly complex surgery, including neurosurgery and open heart operations, which are being done more and more in VA hospitals. This is the surgery which alters the fundamental physiology of human beings, he pointed out, adding: "For general use in routine surgery, this type of highly complicated machinery, recording, and analysis is unnecessary but is an advance in the research area for study of physiologic changes in special circumstances and in selected operations."

Also, he said, after a great deal of information from the electronic monitoring has been accumulated, doctors may learn whether such monitoring is needed in general surgery where it is not at present considered essential. He predicted that there is no doubt but that additional refinements and applications will be developed for the surgery of the future with temporary control of various vital life processes a certainty resulting from this beginning.

## VA APPOINTER DR. CHRISTIANSON

Dr. Lawrence G. Christianson, chief of medical service at the Fort Meade, S. Dak., Veterans Administration hospital, has been appointed assistant director of medical service for the VA. In his new post in Washington, D. C., Dr. Christianson will furnish professional leadership for medical service in the VA's hospitals and outpatients clinics nationwide. He is a diplomate of the American Board of Internal Medicine.

## DOMICILIARY MEMBERS AND COMMUNITY ENDEAVORS

Old soldiers don't all just fade away, these days, the role of Veterans Administration domiciliary residents in community activities testifies. An increasing number of the 16,000 disabled veterans who live in the VA's 18 domiciliary homes are taking an active part in worthwhile community endeavors.

At the Wood, Wis., domiciliary, for example, even the more severely disabled veterans make a contribution to the community through their sheltered workshop. Their achievements include assembling some 240,000 pieces of printed matter into marcher's kits for the United Association for Retarded Children, Inc., labeling a mailing of about 75,000 cards for Christmas seal donations for the Wisconsin Anti-Tuberculosis Association, and working on mailings of about 20,000 other pieces monthly for this Anti-TB Association. They also have assembled, stuffed into envelopes, addressed, and bundled for mailing thousands of other pieces of printed material for the Easter Seal Society of Milwaukee County, United Cerebral Palsy of Milwaukee, Inc., and the United Federal Health Agencies. In another project, for the Boy Scouts of America, the Wood sheltered workshop group traced and cut about 1,500 paper eagles.

The VA domiciliaries have a long and historic past. Dating back to Civil War days, they were founded by Congress as the National Home for Disabled Volunteer Soldiers, and for many years they furnished only a place for "rocking chair retirement." But today, in line with the concepts of modern medicine, the homes provide constructive activities as a part of rehabilitation to get the disabled veterans back on their feet and into independent living again so far as possible.

The projects undertaken vary widely, with the interests of the residents and the opportunities available in nearby communities. In Bonham, Texas, the County Home is a brighter place because of members of the VA domiciliary there. As part of their rehabilitation therapy, the disabled veterans of the Bonham VA domiciliary recently made and presented to the County Home framed pictures, plastic floral arrangements, book and magazine racks, waste baskets, table lamps, shelves and many other items.

Members of the arts and crafts program at the Bath, N. Y., VA domiciliary have reconditioned thousands of toys for the Junior Chamber of Commerce to deliver to needy children at Christmas for the past 10 years.

The Dublin, Ga., VA domiciliary has been fully activated for less than a year, but members there have contributed to support of Little League baseball and Midget Football teams, sponsored a contestant in the local "Miss AMVETS" beauty contest, become active in local church activities, and contributed to the National Health Agencies drive and to the Red Cross.

An average of ten members per month from the Clinton, Iowa, VA domiciliary are contributing blood regularly to the Clinton County Chapter of the Red Cross, for its blood bank quota.

The Dayton, Ohio, domiciliary members sponsor an annual Easter egg hunt. Last Easter, 135 children from two local orphanages participated in the hunt for 1,200 eggs which were colored by the woman veterans and hidden by the men from the domiciliary.

Not all the projects are group endeavors. There is 86-year-old Nat Williams of the Biloxi, Miss., VA domiciliary, for example, who is widely recognized in the philatelic field. He works with Boy Scouts, Girl Scouts, and other young people, stimulating their interest in stamp collecting and encouraging their efforts by subscribing to first-day covers for them. Henry Shaw of the Biloxi domiciliary voluntarily worked, without pay, for two years, helping in the masonry work and plastering of the Christian Missionary Alliance Church in Biloxi. And the Los Angeles, Calif., VA domiciliary reports a 93-year-old woman veteran there recently made and donated her one-thousandth sweater to a children's organization in Pasadena.

## VETS OF THE NINETIES BAFFLE MEDICAL SCIENTISTS

That amazing group of young octogenarians, the Spanish-American War veterans of Massachusetts, has furnished a new surprise in the field of aging. They first surprised the Veterans Administration by being so remarkably long-lived and so young and healthy for their years. VA doctors in Boston are studying them in the hope they will furnish clues to helping other oldsters.

The VA doctors had speculated that since the Massachusetts SAW veterans had neither an easy environment nor modern medical care in earlier years, their health and longevity might be due to constitutional makeup of body build. Not so, say Drs. Oliver J. Harris and James F. Cummins of the Boston VA outpatient clinic, for 134 of these 72 to 92 years old "youngsters" who have been studied thoroughly. Their average age is 82.

Instead of being tall and lean, as had been expected, most of the veterans are shorter and rounder—of just the type of body build that furnishes the likely candidate for coronary heart disease at a rather young age.

"Expectations were to find these men appearing much as Abraham Lincoln might have looked at 80," the two doctors reported, "but instead they turned out to appear more like Churchill and Hoover."

"Men of this type of body build, the endomorphic mesomorphs, tend to die out rapidly in their forties and fifties, especially from coronary artery disorder."

Nor did these 134 hearty senior citizens of Massachusetts seem to have worried much about keeping their weight down after they reached 50.

"Contrary to expectations, one third reached their highest weight past 70 years and one half past 55 years," Dr. Harris and Dr. Cummins said. Not one of the 134 has developed cancer of the lungs, although 25 continue to be heavy smokers, and 51 were heavy smokers in the past. All are remarkably healthy both physically and mentally, appear to be practically free from accident-proneness, and have been relatively free from any damaging effects of degenerative vascular disease.

Twenty-three have never had a serious illness.

The two doctors said they will extend their study to include Korean Conflict, World War II, and World War I veterans—a cross section of the male population from age 29 to age 70. The Boston VA outpatient clinic intends to study them throughout their lifetime, as is being done for the SAW veteran.

"It is our hope that in this way norms for various age groups may be established, and clues to degenerative diseases may be revealed," Dr. Harris and Dr. Cummins said.

## BRAIN BLOOD FLOW TRACED BY RADIOACTIVITY

An atomic medical technique that readily reveals abnormalities in brain blood flow that may lead to brain damage from strokes has been developed by Dr. W. H. Oldendorf, neurologist of the Veterans Administration Center in Los Angeles, Calif. The technique also is useful for more readily diagnosing other abnormalities of the blood vessels of the brain.

The procedure tracks the blood flow and distribution in the brain. It causes the patient no discomfort except the slight pain of the point of an injection with a small needle.

A small amount of radioactive iodine (I-131) is injected into an arm vein. The amount of the iodine reaching the brain a few seconds later is measured by a pair of radioactivity counters which are positioned over the head, one over each longitudinal half of the brain.

The radioactive iodine is in a chemical form which disappears rapidly from the blood and is excreted by the body. Thus the test can be performed as often as hourly if needed, to observe changes in stroke victims or patients with other brain bloodway disorders.

## CONFERENCE TO FEATURE SPECIAL RATES

The Tri-Organizational Scientific and Clinical Conference to be held in Indianapolis, July 10-15 will offer several special features at attractive rates according to Conference Chairman Paul Roland. Among the features are:

- Special convention rates of \$6.50, single, and \$9.00, double at the Sheraton-Lincoln Hotel.
- All children under 14 free.
- Conference Registration fee (\$14.00) includes food and entertainment nightly. Extra entertainment fee for wives only \$2.50 for the week.
- Free parking at the Sheraton-Lincoln.
- Free swimming at the Student Union Building—bring own suit.

## GLEASON NEW V.A. HEAD

John S. Gleason, Jr., who assumed his duties as Administrator of Veterans Affairs on February 10, 1961 combines an extensive background in business with a long-time interest in veterans and military affairs. A Chicago banking executive and combat veteran of World War II, Mr. Gleason is the sixth man to serve as head of the Veterans Administration since that independent agency was established by law in 1930. Entering office at age 45, he is the youngest man ever to hold the title of Administrator of Veterans Affairs. In his new position, Mr. Gleason will be in charge of about 172,000 employees in an agency that has annual expenditures of approximately \$5-billion, and the responsibility for administering laws applying to eligible beneficiaries among the nation's nearly 22,500,000 veterans.

As Administrator of Veterans Affairs his responsibilities include administration of the G. I. insurance program serving more than 6,000,000 veterans holding policies with a face value of over \$42-billion; operation of the largest medical program in the United States consisting of 170 Veterans Administration hospitals and 91 clinics; conduct of a G. I. loan program which has provided home loans for more than 5,000,000 veterans, and a G. I. Bill educational program which so far has given training to some 10,000,000 veterans, and administration of a compensation and pension program providing payments on behalf of more than 4,000,000 veterans.

Mr. Gleason was born in Chicago on February 11, 1915, attended Georgetown Preparatory School in Washington, D. C., and was graduated from the University of Notre Dame in 1936. He engaged in post-graduate study at the Harvard University School of Business Administration, and the University of Wisconsin School of Banking.

In 1941 he interrupted his business career with The First National Bank of Chicago to enlist in the Army as a Private. By the end of World War II he was a Lieutenant-Colonel and a veteran of combat campaigns in New Guinea, the Marshall Islands and the Philippines. His military decorations and awards include the Silver Star, Soldiers Medal, Legion of Merit, Bronze Star with two oak leaf clusters, and the Philippines Legion of Honor.

After World War II he helped reorganize the Illinois National Guard, and became a Colonel in 1950. He was promoted to the rank of Brigadier-General in the Army Reserve in 1956, and to Major-General in 1958 as Commanding General of the 85th Infantry Division, Army Reserve.

Resuming his career in The National Bank of Chicago after the war, he was elected an officer of the bank and in 1955 was named a vice-president. He became president of Chicago Helicopter Airways in that same year.

Mr. Gleason has long been active in veteran organization work. Starting as a Post Commander in 1946, he held increasingly important posts in The American Legion culminating in his election as National Commander of that organization on September 19, 1957. He is a member of The Veterans of Foreign Wars, The American Veterans of World War II (AMVETS), and The Military Order of the World Wars. For 13 years he served as a member of the State of Illinois Veterans Commission.

He engaged in many civic and charitable activities in the Chicago area including chairmanship or vice-chairmanship of the Red Cross, Chicago Youth Foundation, Girl Scouts of Chicago, United Cerebral Palsy, and the National Conference of Christians and Jews.

He also serves on the President's Committee of the University of Notre Dame, and the Advisory Committee for Loyola University of Chicago. He was selected as a Notre Dame "Man of the Year" in 1958.

The Administrator and his wife, Mary Jane, maintain their residence at 735 Sheridan Road, Winnetka, Illinois. They have six sons — Jack, 17, Dan, 13, Dick, 11, Tom, 9, Dave, 7 and Marty, 4.

## DR. MACFEE HONORED

Dr. William F. MacFee, Chief of Surgery at the Veterans Administration Hospital, New York City, was awarded the Veterans Administration's highest honor—the Exceptional Service Award. The award was presented by Dr. William S. Middleton, VA Chief Medical Director, Washington, D. C., in behalf of the Administrator of Veterans Affairs at the VA hospital in Manhattan.

Dr. MacFee has been chief of the Surgical Service at the hospital since August 2, 1954. At the time of his appointment he was clinical professor of surgery at Cornell University Medical College and director of surgery at St. Luke's Hospital, New York City.

The award was given Dr. MacFee "in recognition of his exceptional contributions to the accomplishments of the Veterans Administration in the medical care of veterans, in residency training for physicians, and in clinical research."



Once, but not any longer. Twenty-five years ago most mental illnesses were considered hopeless. Today thousands of mentally sick people are recovering. With the basic knowledge science has already acquired, we can now go on and find ways to help all the mentally ill. This is the aim of the research program of the National Association for Mental Health—to find effective treatment methods for those mental illnesses that still resist treatment, and to prevent mental illness. Support that program. Give at the Sign of the Ringing Bell.



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